EA-90-01

ENVIRONMENTAL ASSESSMENT BOARD

Ontario

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 23

DATE: Monday, June 3, 1991

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, on Monday, the 3rd day of June, 1991, commencing at 10:00 a.m.

VOLUME 23

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

S T A F F :

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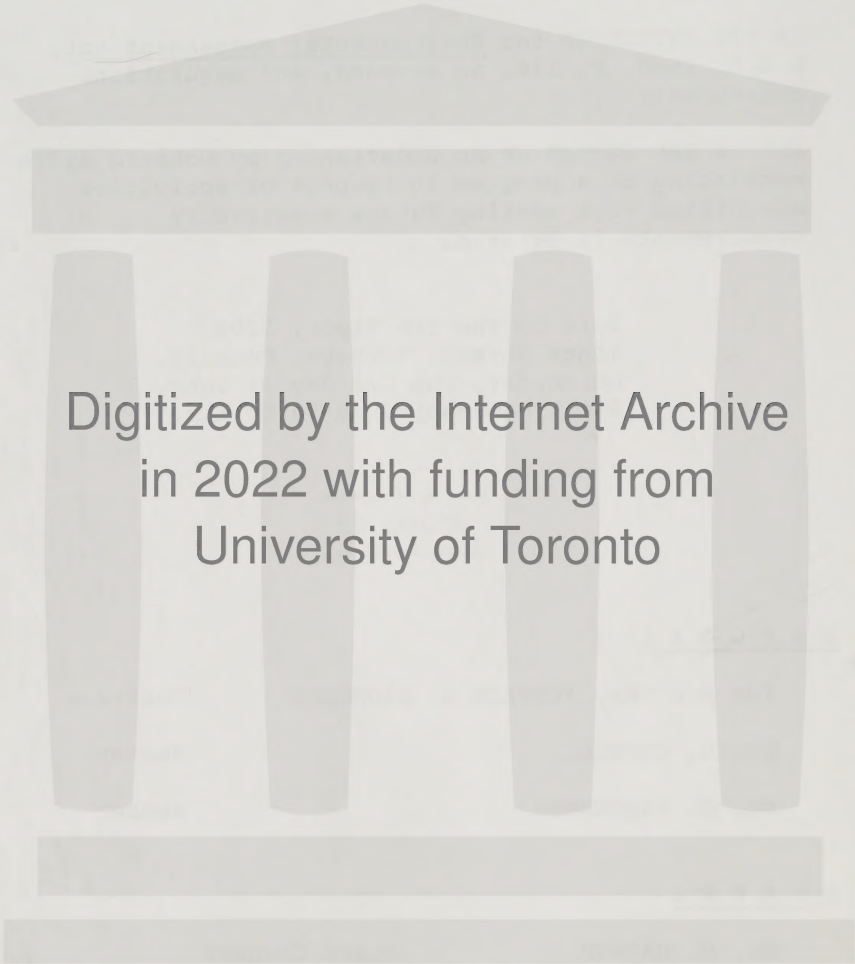

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B. KELSEY L. GREENSPOON	)	NORTHWATCH
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J. PASSMORE G. GRENVILLE-WOOD	)	SESCI

A P P E A R A N C E S
(Cont'd)

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R. POWER	CITY OF TORONTO, SOUTH BRUCE ECONOMIC CORP.
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B. BODNER	CONSUMERS GAS
J. MONGER) K. ROSENBERG) C. GATES)	CAC (ONTARIO)
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T. HILL	TOWN OF NEWCASTLE
M. OMATSU) B. ALLISON) C. REID)	OMAA
E. LOCKERBY	AECL
C. SPOEL) U. FRANKLIN) B. CARR)	CANADIAN VOICE OF WOMEN FOR PEACE
F. MACKESY	ON HER OWN BEHALF
M. BADER	DOFASCO

INDEX of PROCEEDINGS

L I S T o f U N D E R T A K I N G S

L I S T o f U N D E R T A K I N G S

---Upon commencing at 10:05 a.m.

THE REGISTRAR: Please come to order. This hearing is now in session, please be seated.

THE CHAIRMAN: Mr. Shepherd, what is your time frame?

---Off the record discussion.

THE CHAIRMAN: All right.

MR. SHEPHERD: The question -- oh, yes, how long. I lost the question.

I will be finished by lunch. How much earlier than that, I'm not sure, but I would guess we have about another two hours of cross, hour and a half to two hours roughly.

THE CHAIRMAN: And we next have the South Bruce Economic Development Corporation. Mr. Power?

MR. POWER: Yes, I expect it will take about a half hour or so.

THE CHAIRMAN: Then the Solar Energy Society of Canada? Is that Mr. Grenville-Wood?

MR. SHEPHERD: Geoffrey is on his way. I think he's flying down this morning, so he will be here.

THE CHAIRMAN: He plans to be here.

MR. SHEPHERD: Oh, yes.

THE CHAIRMAN: Does anyone have any

handle how long he plans to take?

MR. SHEPHERD: The last I heard, he thought he was going to be about an hour, but that was during his preparation, so I don't know what his final was.

THE CHAIRMAN: Ontario Natural Gas, Mr. Rogers? Anyone here from his office? What do we know about him? Someone better get in touch with them.

Dofasco? Someone better get in touch with them.

Coalition of Environment Groups, Mr. Starkman?

MR. STARKMAN: Yes, Mr. Chairman. Our best estimates are we will be about half a day.

THE CHAIRMAN: And you are ready to go today if it comes up today?

MR. STARKMAN: Yes.

THE CHAIRMAN: Northwatch? No one here on Northwatch? They should be contacted.

MR. STARKMAN: Mr. Chairman, I spoke to Mr. Kelly this morning, and I believe he was having some discussions with Christine Martin about the timing of his questions, so, I think she's trying to resolve something about the order.

THE CHAIRMAN: City of Toronto?

MR. POWER: Sir, I have spoken with Mr. Poch. He will be here later in the day. I think, although he said during this during his preparation, he would be about an hour.

THE CHAIRMAN: All right.

Perhaps when Ms. Martin speaks with Northwatch, we should find out how much time they plan to take.

Ontario Public Health? Anyone here on that for them? They should probably be contacted, too.

Consumers Association, Mr. Monger?

MR. MONGER: We have less than half an hour with the cross examination.

THE CHAIRMAN: Less than half an hour? All right.

Northumberland Environment, who represents them?

MRS. FORMUSA: Ella DeQuehen, she's not here.

THE CHAIRMAN: She's not here today? She should be contacted.

Anishnabai? Do you know anything about them, Ms. Marlatt, what their plans are?

MS. MARLATT: I believe that they were planning on cross examining, and it was roughly around

two hours, I believe. But that was last week while they were preparing, so I'm not sure where they stand now.

THE CHAIRMAN: Moose River/James Bay Coalition, they would be working together you think?

MS. MARLATT: Yes, that is my understanding.

THE CHAIRMAN: North Shore?

MS. MARLATT: We estimate that we will be less than an hour.

THE CHAIRMAN: OMAA?

MS. OMATSU: Sir, I would estimate less than one hour, sir.

THE CHAIRMAN: I can't quite hear you.

MS. OMATSU: Less than one hour.

THE CHAIRMAN: Less than an hour? Thank you.

Nipigon Aboriginal People's Association.

MS. OMATSU: They have advised me that they will not be cross-examining during this panel.

THE CHAIRMAN: Ms. Mackesy?

MS. MACKESY: One to two hours.

THE CHAIRMAN: Mr. Hunter? Not here today.

And the government.

MS. COUBAN: Probably less than an hour, Mr. Chairman.

THE CHAIRMAN: We look as if we have got a good chance of finishing this panel this week, if everything goes well.

All right, Mr. Shepherd?

RONALD TABOREK,
DAVID BARRIE,
JOHN KENNETH SNELSON,
JUDITH RYAN; Resumed

CROSS-EXAMINATION BY MR. SHEPHERD (cont'd):

Q. Witnesses, just before we continue on with the discussion of environmental issues we were working on Thursday, I have a couple of questions that arise out of your previous cross and the transcript undertakings filed on Thursday. So, I'm going to ask you first to turn to Exhibit 142.5. This is the fifth of the transcript undertakings for--

THE CHAIRMAN: We don't have that.

MR. SHEPHERD: --the MEA. This was just filed on Thursday, Mr. Chairman.

THE CHAIRMAN: I know. We probably don't have copies of it. 142.5? I think the panel needs copies, too.

MR. SHEPHERD: I am also going to refer to 27, Laura.

I am sorry for the disorder, Mr. Chairman. I only actually looked at this about ten minutes ago, so I didn't have time to provide copies.

THE CHAIRMAN: I think it would be better if we had the documents. Otherwise it is hard to follow.

MR. SHEPHERD: Yes. I see lights flashing in the background, so I assume copies are being made.

Mr. Chairman, the transcript reference, as you can see, is page 3018 at line 17.

Q. Is this your answers, Mr. Barrie?

MR. BARRIE: A. I don't think so.

Q. I can't tell from this excerpt. Maybe this is Mr. Taborek?

MR. SNELSON: A. I think I gave the undertaking, so maybe I should answer your questions, if I can.

Q. I guess all I'm trying to figure out -- the vacuum building example, which is what is being referred to in the transcript. If I understand it correctly, that is a fairly tidy example of a common mode failure, is that right? It is a typical type of common mode failure you might have.

A. It is a very extreme example of

common mode failure and an unlikely incident to occur.

Q. I guess the reason why I'm having a problem here is that as I recall your projections of common mode failures, you were talking in terms of a few days as the average duration, four days, six days, like that. And on this particular one, the vacuum building going down, which it has to do with a unit fails in a certain way, right? The vacuum building then has to shut off all the units, is that right?

...

[10:15 a.m.] A. If there is a failure of several systems, then the vacuum building may be used. The probability of its use is quite low. For instance, when there was a major rupture in a pressure tube at Pickering, then, in fact, none of the emergency systems were required to shut the unit down. And so, this is an event that has never happened and is relatively unlikely to happen.

As to any better definition of that, then I think that Panel 9 would be the panel who would give you further details.

Q. Of course. I guess the question I want to ask then is, given that you are expecting values in numbers of months for this particular type of common mode outage, is it safe to conclude from that that the sort of projection that you have used in the 1990 reliability indices, that is a certain number of potential failures with a probability distribution of duration, isn't really the right sort of way of looking at common mode outage; that is to say, the particular example may be so far away from your median probability as to make the projection useless; is that fair?

A. I think it is fair to say that common mode failures are very diverse, they encompass a lot of things that have relatively small probabilities and

that it is a very difficult area to do meaningful statistical analysis in, and that is why the frequency and duration program has not been modified to separately account for common cause failures. That's why Exhibit 87 looks upon common cause failures as a separate judgmental factor.

Q. Now, Mr. Taborek, you were talking common mode failure on Thursday, and we looked briefly at this statistical model. Are there other ways of looking at common mode failure that will be operationally or, from a planning point of view, more useful than a statistical analysis of probability distribution?

MR. TABOREK: A. The judgmental effect approach described by Mr. Snelson, or referred to by Mr. Snelson.

Q. Have you explored other methods of looking at that sort of event, other techniques for analyzing them?

A. Yes.

Q. Can you give some examples?

A. Sequential runs of the F&D model weighted and using with different common mode failures modelled and then weighted according to the probabilities would be another approach to attempt to

calculate this analytically. The difficulty with that approach is the data.

Q. That is still a statistical analysis though, right?

A. Yes.

Q. Are there any other techniques you could use for that, non-statistical analysis, if you like? I am not an expert in this; I am just exploring.

A. It is a probabilistic assessment that you are that you are trying to make and it has to be a probabilistic calculation. Is that what you mean by "statistical"?

Q. Yes, probabilistic.

A. Yes, so it has to be a probabilistic calculation.

Q. So, except for using judgment, sort of an intuitional approach, if I can coin a phrase, except for that, really the only methods you have to look at it would be probabilistic ones?

A. All reliability calculations are probabilistic calculations, one way or another.

Q. All right. Now, let me refer to, if I have it, 142.27. Now, for this one I do have some copies.

Again, this is just by way of

clarification from Thursday. We had a discussion about incapability factors and forced outage rates for non-utility generators, and then this was filed, referring to planned outage factors of 9 per cent and maintenance outage factors of 2 per cent for non-utility generators. Is that essentially what this says?

A. Yes.

Q. That's what you used in your F&D run?

A. Yes. Well, there is also the forced outage factors.

Q. Plus the 10 per cent?

A. Yes.

Q. And I looked around and I couldn't find these figures anywhere else. I looked in the 1989 reliability indices and the 1989 reliability indices, and I can't find them anywhere. Can you tell me where they came from?

A. Just one moment, please. I am going to look up an interrogatory.

The forced outage rates were from the 1989 forecast of reliability indices.

Q. Yes, we discussed that on Thursday.

A. Exhibit 148, page 22, Table 17.

The planned and the maintenance outage

factors were, I believe, some standard industrial, I think NERC projections, if my memory serves me right.

THE CHAIRMAN: I am sorry, what projections?

MR. TABOREK: N-E-R-C, North American Electric Reliability Council, information that we had.

MR. SHEPHERD: Q. I must admit, this has got me pretty confused. In 1989 you said the planned outage factors for NUGs was zero and the maintenance outage factor was 5 per cent. In 1990 you used the same numbers, planned outage factor zero, maintenance outage factor 5 per cent. But somehow, in the middle of those two, in doing and your analysis of system reliability, you used totally different numbers. I don't understand why you would.

MR. TABOREK: A. I think they weren't adjusted because they are not important to the analysis.

Q. So, it wouldn't make a difference to your relability of the overall system if you used any numbers here?

A. That's correct.

Q. And that's because you only have a small amount of NUGs in the system?

A. No, it's because it's the forced

outage factor that impacts on the reliability. The maintenance outage factor and the planned outage factor have little, if any, effect on reliability.

Q. Well, I wondered about that myself but then I looked Table 14 on page 19 of Exhibit 148, the 1990 forecast of reliability indices, which you just referred to, I think. No, you referred to the other one.

Page 19, Exhibit 148, the 1990 forecast, in under planned outage factors it has N/A and below it says, "Not applicable since NUG maintenance outages - which I presume refers to planned maintenance outages - are typically tied to steam demand and are not deferrable into the next season." Which I take to mean that for NUGs, planned outages are closer to forced outages in the sense that the NUGs don't have as much room to move to move around; is that right?

...

[10:25 a.m.] MR. SNELSON A. The reference to electrical output being tied to steam demand is also related to the 10 per cent attributable to steam derating, which is shown in the DAFOR line of 15 per cent.

Q. Well, I think that's exactly my point. Haven't we concluded previously that if you move something from planned or maintenance outage to DAFOR, that's going affect for reliability of an option; right?

A. Yes.

Q. And it seems to me here, that we have in one model a total of 11 per cent in planned and maintenance, most of which has been shifted to DAFOR for the purposes of the reliability indices?

A. And the reason for that is given in this N/A comment on page 19. That is that the NUG outages are related more to steam demand than to electrical demand. But the more detailed justification of what's on page 19 should go to Panel 5.

Q. Yes. It is, in fact, the non-utility generation division that supplies the numbers on these charts; right?

A. In recent years, yes. There has been an evolving process.

Q. But the numbers referred to in the transcript undertaking were not supplied by NUG division?

A. I believe that predates obtaining this degree of detail from the NUG division.

Q. All right. But I am right in understanding that the numbers referred to in the transcript undertaking are after the 1989 reliability indices were published and before the 1990 reliability indices were published; is that right?

MR. TABOREK: A. Yes.

Q. So, somewhere in the middle there you decided to use a whole different set of numbers?

A. No. We used the 10 per cent for forced outage rate that was in the 1989 report, and it's just that we did not adjust, in our model, the planned and the MOF because it did not impact the results.

Q. Okay. The one other area I want to just nail down, if I can, is the problems at Darlington. I went back and read through the transcript, and not being a nuclear engineer, I don't a lot about it. But, Mr. Barrie, you refer to a problem with the fuel handling equipment.

MR. BARRIE: A. That's correct, yes.

Q. Do I understand correctly that the essence of your problem is that you have a pump, a very large pump, in fact, that vibrates when it operates, and you have fuel bundles whose natural frequency is the same as the pump's vibrations, with the result that when the pump vibrates, they vibrate too; is that right?

A. I don't know.

Q. You haven't looked into the reasons for the problem at all?

A. I don't know the reason to that level of detail. I know it's a problem with the fueling machine and the way it is locking onto the fuel bundles. I do not know that it's related to any pump. It may be, but I'm not aware of it.

Q. So, despite the large impact this would have on your system's operation, you haven't actually looked into the nature of the problem?

A. The problem is currently under investigation. I've told you the extent to which I understand the problem.

Q. Would there be somebody else in your group that would look at it in more detail?

A. Probably not. My division is concerned with the fact that the units are off line and

when are they coming back. That is essentially the level that we need to know. Now, because we're interested engineers we may go into further detail to find out the details of what's happening, but essentially all we need to know is when is it coming back.

Q. And in that respect you just accept whatever the nuclear division tells you?

A. Yes.

Q. So, as of right now, they've told you that it's coming up, Units 2 and 1 are coming up, November 1st, '91, and may be delayed a couple of months so, maybe don't count on them this year?

A. No. Unit 1 is coming back for some tests during the summer then will be taken off again and 1 and 2 will be both coming back in November. That's was the information we had.

Now, when we do our analysis of how we're going to meet the energy requirements for the year, we may choose to do some sensitivity analysis to see if these estimates are incorrect, what would be the impact upon our operations.

That's not to say that we know that they're going to be late. We just think that it is prudent that we should analyze that kind of situation.

So, I think I mentioned in my previous testimony we have looked at the possibility of them not coming back this year. And that is not because we know anything more about it than the nuclear generation division. We don't. They are the experts. We just do that as part of our contingency analysis.

Q. But your contingency analysis doesn't extend beyond the end of 1991, does it?

A. Not to the level of specificity that we have done to the end of 1991, that's correct.

Q. You understand the nature of the problem I just described, this resonance between one piece of equipment and the natural frequency of the fuel rods? You understand, from an engineering point of view, that sort of problem?

A. Yes, but I'm not a nuclear physicist and I think I've explained my level of understanding of the issue.

Q. Okay. And then did I understand correctly on Thursday you advising us that the last you heard, at least, there is a second problem, and that is a problem with the rotors, which as far as you know has not yet been solved?

A. That's correct. There's a crack in the rotor.

Q. I'm sorry?

A. There was a crack detected in the rotor, and reason for it is under investigation with the manufacturers, ASEA Brown & Boveri.

Q. And there was, in fact, a crack found in the second rotor, wasn't there?

A. I believe that's true, yes.

Q. And that problem has not been solved yet? Nobody knows the reason for that yet?

A. I think that's correct.

Q. And if it isn't solved, am I correct that these units will not be on stream on November 1st this year or not even this year at all?

A. The rotor has to be functioning properly before we can put the machine back. If it's not, then we will not put the machine back. I don't know whether it will or will not be.

Q. Okay. To go into any detail on that, I presume I should wait for Panel 9?

A. I think Panel 9, who are staffed by nuclear experts, will be able to give very full and comprehensive answers, much more so than I possibly could.

Q. All right. Back to the environment. Ms. Ryan, when we were talking to the forecasting

panel, we talked a lot - everybody talked a lot - about the category of high-impact, low-probability changes, and we particularly talked a lot about environmental change of that category.

Can you tell us, how does Ontario Hydro deal with the possibility that environmental rules or government policies associated the environment or even social values associated with the environment would undergo a radical change, a significant directional change, if you like, presumably towards more environmental activism, as it were.

MS. RYAN: A. I believe we've provided you with a copy of our business planning assumptions.

Q. Yes?

A. And that is the first layer of providing a forecast of what is going to happen and have the organization incorporate that into their business plans.

Q. The business planning assumptions though don't contain any assumptions or even indications of radical change, do they?

...

[10:37 a.m.] A. Perhaps you could give me an example of the type of radical change you are thinking about.

Q. Well, we talked with Mr. Rothman, for example, about the notion -- he dealt with it in his direct evidence, for example, that the governments would, in effect, adopt and internalize the notion of a sustainable development. It was his view, in fact, that -- I was going to get to this in a second. It was his view that, to date, we haven't seen a government commitment to sustainable development, and if we did, that would be a radical break from the past. Those were his words, radical break. Then my question, I guess, who is it or how do you, at Ontario Hydro, deal with that sort of possibility, a radical break from the past?

A. I have not reviewed Mr. Rothman's evidence where he said that, so I will take it that that is essentially the context. I think with the example of sustainable development, that is a concept that governments and industry in general are still grappling with as to what does it mean to us in our planning for the future, and I don't think anyone has come to an end point definition. I think what we are all doing right now is considering that a path to go, and the more you can do in that direction the better.

And I think our plans in providing for the best available control technology on our future planned stations is heading in that direction. Whether or not it will get us there remains to be seen, but I don't think -- well, I'll leave it there.

Q. Well, I guess what I'm trying to drive at, though, is I understand that you anticipate future change, but from all the evidence I have heard from you, it appears that you anticipate a continuation of the change as it has been happening so far. There would be no acceleration, the trend would be roughly the same. Isn't that a fair assessment of your future assumptions for environmental regulations?

A. I think the last five to ten years have seen quite a radical change in the way people perceive the environment and the importance of it and what needs to be done. And if, in fact, that rate continues, I think there will be a sizeable change in the environment in the future, if we continue on the trend we are on.

From a business point of view, I guess our system planners, and they can talk to it better than I can, have a range of alternatives to be used in the future, and the important part of the process is that it is able to accommodate new things as they

arise. We don't limit the types of things we are going to be able to incorporate over the next twenty years to what we know now. The important thing is to have a process in place that will accommodate them as they come and to have given some thought to how they might be accommodated.

Q. When you say to have things in place, do you mean -- I mean one way of having things in place is to have a plan with contingencies right in it and sort of, if this happens, we will go in this direction.

The other way is to say, "We are planning for a particular future, but if the future turns out to be different than we expected, in five years we will be back here and we will be talking about a new plan. Which way do you mean that you have taken it into account?

MR. SNELSON: A. I think we are saying in Chapter 17 of the plan document, which is Exhibit 3, that our plan has a considerable degree of robustness to accommodate changes in regulation.

I think that the important point of the planning is that the plan have in it prudent allowance for the things that have got a reasonably high probability of occurring. And when it comes to radical change, just by the very nature of the word radical,

this means that it is significant change, and it is very hard to predict if and when radical change will occur and in what direction.

So, the important point for planning is to have made prudent allowance for the reasonably anticipated changes and to retain as much flexibility to adjust to radical change, if it were to occur.

Q. When we are talking about radical change, Mr. Snelson, maybe we are not quite on the same wavelength. I'm thinking of things like the nuclear moratorium being made permanent. You don't have a contingency plan for that, do you?

A. We have considered, in this planning process plans that do not involve nuclear.

Q. That is true, but then you wouldn't meet your acid gas limits in those plans, would you? And indeed you'd have carbon dioxide problems as well.

A. We would meet the law with respect to acid gas and carbon dioxide.

Q. Well, there isn't a law with respect to carbon dioxide, sir.

A. Exactly.

Q. Who, at Ontario Hydro, looks at things like what you would do in the case of a carbon tax or in the case of a tradeable emissions strategy?

I'm asking Ms. Ryan actually.

A. With respect to carbon dioxide controls, we did a study on that, which is Exhibit 40.

Q. Yes.

A. And that is the sort of prudent consideration of the possibility of radical change that I referred to. And that document, because it is a future change that you can't define with a great deal of precision, because you don't know what direction it is going to take, that document does look at a range of possibilities from the possibility of carbon dioxide controls being effective only on the electricity producing sector, through to carbon dioxide controls being effective on society at large.

It did not speculate as to the actual means of making carbon dioxide controls, whether it would be by a tax or whether it would be by other such means. And you have to, in that circumstance, consider both the effect on the electricity producing sector, and the indirect effect on the electricity producing sector, from the possibility that people will shift from fossil fuels to electricity, and that there may be an impact on electricity load.

So, those factors were considered in Exhibit 40, and that is, I believe, the sort of example

of prudent consideration of the possibility of future change that I have referred to.

Q. Thank you, Mr. Snelson.

Now, Ms. Ryan, my question was, I think, who is it on Ontario Hydro that is responsible for looking at radical change and how you create contingency plans to deal with it? I'm thinking only in the environmental area.

MS. RYAN: A. It would be environment division in conjunction with the other environmental support groups, and the environmental policy committee and technical committee that would have a responsibility for identifying what needed to be looked at for the future.

Since our environmental responsibility is distributed throughout the corporation, no one person generally carries out the full study. It would be those people who have a stake in it from their part of the business that would participate. I guess, without a specific example other than sustainable development, which we are looking at, and what it means to our business, I'm having some difficulty in answering your question directly.

Q. Let's come back to sustainable development. You say you are looking at it now. Is

there a study going on or something like that?

A. Environment division has, as one of its responsibilities, the need to look at sustainable development and what it means to our business and what types of things can be put in place to help the corporation move in that direction.

Q. Have you, in environment division, have you made any attempt to identify the major changes that could occur over the next 20 to 25 years that would affect Hydro's business? The major changes. I'm not talking about little things, the big things. Have you made any attempt to do that?

A. I guess the study that Mr. Snelson referred to, which is Exhibit 40, was one of the first areas that was looked at, which is global warming and the impact, either from us having to limit carbon dioxide emissions or it causing a significant shift in our hydraulic system or the temperature of lakes, such that it impacted our ability to generate and transmit electricity. So, those individual types of studies are carried out as the need is identified.

From the broader, what will the environment hold for us in the next twenty years, that is something that is on environment division's work program and has not been completed at this point in

time.

Q. You are actually working on putting together some sort of list or summary or outline of what the future could hold--

A. Yes.

Q. --if you like.

Do you have an idea of when you expect that to be complete?

A. It is in the initial stages now. We are just scoping it, I can't give you a definite date. I would hope by the end of the year, but it might be spring of next year.

Q. Mr. Rothman, in the quote I referred you to, actually I will read you the whole quote:

> "We also haven't seen a government commitment to that kind of radical break from past trends in environmental regulations that a sustainable development commitment might imply.

In light of your comments just a minute ago about the changes you have seen in the last five years, do you agree with his statement, that there has been no government commitment to sustainable development?

A. I believe government is also

grappling with the difficulties of defining sustainable development and what it means to business.

Q. Is that a yes or a no?

A. I would want to read the quote again.

Q. "We also haven't seen a government commitment to that kind of radical break from past trends in environmental regulation that a sustainable development commitment might imply."

A. I guess the difficulty I have with your question is I don't see a movement toward sustainable development as a radical change. I see it as a process that we are getting better at it.

Q. Evolutionary as opposed to radical.

A. Yes.

Q. Just as an aside, Mr. Rothman also said that in his view as an economist, and I presume there is an economist point of view on this and an environmentalist view on this, in his view as an economist there is an economic penalty to be paid for improving the environment. That is, as you have more environmental regulation and try to do better on environmental controls, the result is less economic growth. Do you agree with that?

A. I'm not an economist. I don't think

I'm in a position to agree with it.

Q. Fair enough; Hydro is currently working on an official statement of environmental priorities, is that right?

A. I beg your pardon?

Q. Sorry, an official statement of environmental principles. Hydro is currently working on a statement of environmental principles?

A. That is correct, yes.

Q. Can you tell us what status of that is?

...

[10:50 a.m.] A. Yes, draft principles have been developed, they were actually developed last year, and what we are looking at now is a communication plan to help us finalize them and get input from a broader base of employees before they are finalized.

Q. Can you provide us with those draft principles?

A. They are draft and may well change because we are going out to the broader employee base to get their input.

Q. Understood. But when you put the them out to the broader base of employees they are not going to be particularly secret, are they?

A. No. Certainly they will be available.

Q. Could we have you provide those?

A. Yes.

A. They are not available immediately, if that's what you are asking. The document that will go is not available immediately.

Q. When is it available?

A. I would have to check on the time frame.

Q. Are we talking days or weeks or months or years?

A. I would think within a month.

Q. If you have a draft prepared -- there is a draft set of environmental principles; right?

A. There are a number of drafts, yes.

Q. Okay. Well, I am confused now.

THE CHAIRMAN: There isn't a draft yet prepared for circulation to the other people in the organization who they want input from.

MR. SHEPHERD: Okay.

Q. This process is taking a very long time; correct? It started out in '89; is that right?

MS. RYAN: A. Yes, it's been over a year now.

Q. Is this a very lengthy or very technical document?

A. No, it's not a technical document.

Q. And it is not particularly long either?

A. No.

Q. Why is it taking so long? What is the problem with it?

A. I guess there are a number. One is person power to physically do the work to get it out. The other was, when we had the principles available and essentially approved in principle by the Executive

Committee, we felt they were so important that to try and have them implemented as the total organization's environmental values without getting input from the broader employee base, was not the appropriate thing to do.

As I pointed out, environmental management is the responsibility of line managers and employees throughout the corporation. So, we did not want to proceed with principles without a broader employee base having had the opportunity to input to ensure that we were reflecting values that they want to incorporate into their every day business.

Q. But, of course, none of the delay, to date, has been the result of that employee communication, has it?

THE CHAIRMAN: I'm sorry, I didn't hear the end of that question.

MR. SHEPHERD: Q. None of the delay, to date, has been associated with going out to the employees, has it?

MS. RYAN: A. Yes, it takes a physically long time to organize such a program and implement it and get appropriate feedback.

Q. You haven't started talking to the employees about this, have you? This communications

program with the employees, it hasn't happened yet, has it?

A. No, it hasn't.

Q. You are designing it now?

A. And getting approval to do it, yes.

There were delays because there wasn't somebody physically available with pushing the project.

Q. What I am trying to drive at, are there matters of controversy within Hydro about environmental principles? Are there basic principles that are being debated heavily?

A. No, not to my knowledge.

Q. So, the delay, to the extent that it has been a delay, has been simply bureaucracy and how long it takes to do things?

A. The value of the principles, a lot of it was in the development of the draft, and so, once we had the draft principles the immediate need to continue pushing the project was delayed.

Q. All right. I am going to ask you to look at Interrogatory 2.14.73. Am I right that this is a paper prepared by an Ontario Hydro employee given at a conference in China?

A. That's correct.

Q. And just as and aside, you don't have

the text of this paper; do you?

A. No, to my knowledge there was no text. It was an overhead presentation.

Q. Could you turn to page 6.6 of that. This is an overhead that says, "Mitigation/ Compensation, Why?" And the first item on the list is corporate policy and image. In the context of the development of your environmental principle statement, can you, just briefly, describe the role of Hydro's image in its environmental policy? To what extent is Hydro's image to the community an important aspect in its environmental policy?

A. I think we think of our image in terms of good citzenship, and in any community where we have a facility, are we, in fact, being a good corporate citzen.

So, I guess, yes, we want to not only do a good job, we want to be seen to be doing a good job.

Q. Fair enough. Can you turn to page 12.2 of this interrogatory. It's the second last page, actually the last page but the front of it. And this is a list apparently in order of priority of environmental issues affecting Hydro. Can you tell me, if you note at the bottom, it says Ranking Reflects 1987 ETC Issues Analysis, can you tell me what that

means?

A. As I pointed out, the Environmental Technical Committee is a director level committee responsible for essentially the management process of environmental issues within the corporation. Back in 1987 they had a process whereby they had a list of issues and ranked them. So, this would be an old ranking.

Q. Yes. And there an analysis that goes behind this; is that right?

A. Yes.

Q. A document of some sort that goes behind this?

A. Yes, that's correct.

Q. Could we have that?

A. I need to check but believe I will have to cross-check because there was one year given out and that particular document stopped being produced around this point in time, and I am not sure what the year of the last document was, but it can be provided.

Q. Now, earlier you said that the Environmental Technical Committee, one of its job is to set environmental priorities; correct? Sorry, not set them. Analyze environmental issues and set priorities; is that correct?

I don't know the transcript; I am just remembering.

A. Yes, its role is to help establish priority for environmental issues.

Q. Does the Environmental Technical Committee still do lists like this one, or something similar?

A. Yes, we have a revised process for environmental issues management and the Environmental Technical Committee plays a role in that.

Q. And does it include a ranking of priorities of issues?

A. Yes, they are listed in order of priority.

Q. Could we get a copy of the most current one?

A. Yes. Actually, it will be provided in an appendix in the 1990 State of the Environment Report and I could have that pulled for you.

Q. Just the list, though.

A. Just the list.

Q. Not the background?

A. Pardon?

Q. The background material would not be in the State of the Environmental Report?

A. No. What is in the State of the Environment Report is an overview of the process without going into a lot of documentation.

Q. Okay. I, wonder then, if you could undertake to provide us with the equivalent of this list for the current year. If it is provided verbatim in the 1990 State of the Environment Report that is fine; if it is not, can you undertake to provide it separately, when it's available?

A. Yes.

MR. SHEPHERD: Mr. Chairman, we haven't actually been numbering these undertakings.

THE CHAIRMAN: I wondered. I was listening for that. Until they were numbered I wasn't going to pay any attention to it.

MR. SHEPHERD: I think this is the third one now this morning. And I think they are 55, 56, 57; is that right?

MRS. FORMUSA: I think the next one should be 56. But I would like to go through what your expectations are with respect to the untertakings.

THE CHAIRMAN: Yes, I think we have to review that, because we don't want any misunderstandings.

MR. SHEPHERD: The first is the draft

statement of environmental principles.

MS. RYAN: When available for generation circulation.

MR. SHEPHERD: When in final form, whether or not publicly released.

MS. RYAN: Yes.

THE CHAIRMAN: You are talking about circulation internally to your employee groups.

MRS. FORMUSA: Well, what happens if it's not released? When is it final? I don't know.

THE CHAIRMAN: Well, if she said there was a plan, or a statement of principles which was going to be circulated to other people outside the group that is generating this particular plan, when that is done, that's when it's to be produced, as I understand it.

MR. SHEPHERD: Mr. Chairman, I think what I am saying is once they finalize the wording of statement, whether or not decide to let anybody see it, I think this Board is entitled to see it. Once the wording is finalized, then it's a document with whatever weight it has.

THE CHAIRMAN: I had understood, and perhaps I am wrong, that that would be contemporaneous with the circulation of it, but if that's not so then I

suppose we should have it as soon as it's ready.

MS. RYAN: I guess my question is, the implications if, in fact, it's a much different document when it's finally adopted and approved as a corporate position.

THE CHAIRMAN: Well, it probably will be.

MR. SHEPHERD: That is fine. So that's 142.56. And then the second one is the issues analysis that goes behind this 1987 ranking, if you have one.

MS. RYAN: If, in fact, there is a document such as that.

MR. SHEPHERD: That would be 142.57.

And then the new list, which would be 142.58.

MS. RYAN: Which is the 1990 environmental priorities list.

MR. SHEPHERD: Environmental priorities list, with whatever analysis goes behind it. That is, if there is issues analysis document that supports a one page ranking, the whole thing is what I am asking for, as with 1987 where there are two things.

THE CHAIRMAN: So, 57 is the analysis behind the chart 12.2 in Interrogatory 2.14.73; is that right?

MR. SHEPHERD: Yes.

THE CHAIRMAN: And that's the analysis that's referred to in the bottom line of that chart.

MR. SHEPHERD: Yes. And then 58 is the similar 1990 documents or whatever the descendant of this document is, with the descendant of the background document, if there is one.

MS. RYAN: Okay, I will have to see what there is.

MR. SHEPHERD: All right.

---UNDERTAKING NO. 142.56: Ontario Hydro undertakes to provide draft statement of environmental principles.

---UNDERTAKING NO. 142.57: Ontario Hydro undertakes to provide issues analysis for 1987.

---UNDERTAKING NO. 142.58: Ontario Hydro undertakes to provide Issues list and issues analysis for 1990.

MR. SHEPHERD: Q. I am not going to go through this list in 12.2 in detail, but I do have a couple of questions.

I note that native rights are sort of fairly that are down the list as compared to, say, herbicides which have a fairly high ranking.

Do you know offhand whether that's still the case?

MS. RYAN: A. I would have to check, but this is an old list.

Q. So, you don't recall offhand whether that particular ranking would be changed?

A. No, I am sorry, I don't.

Q. And similarly, greenhouse gases are right off the bottom of the list. I presume from your evidence that they are no longer unranked.

A. Carbon dioxide is number 21, so it is on the list.

Q. It's not exactly right at the top but it is on the list.

A. No.

Q. And you have ultimate forms of energy, also right off the bottom of the list. Do you know whether that's still the case?

...

[11:06 a.m.] A. No, I don't.

Q. Is it fair to say that Ontario Hydro still sees alternate forms of energy as having a low priority, in fact? Forget the list, now.

A. No. I think their priority has moved up considerably within the organization.

THE CHAIRMAN: Just so we know what you're talking about, what do you mean by alternate forms of energy?

MR. SHEPHERD: Well, certainly the reference I'm making is to solar and wind primarily, although there are many others. But I think those are the ones that have major attention.

Q. I think that's fair, Ms. Ryan?

MS. RYAN: A. Yes, I feel that is correct.

Q. You responded in that context?

A. Yes.

Q. That is, if I was talking about solar and wind?

A. Yes. I was thinking of wiond and solar and fuel cells and that type of development.

Q. Yes. Are you familiar with Hydro's views on wind energy?

A. I'm familiar with the fact that we've

had some demonstrations run, I guess, by our design people and our research people over a number of years, but I'm not familiar with the technical details, no.

Q. Do you know whether, in fact, it's true that most senior officials at Ontario Hydro believe that wind energy is of little or no use and, in fact, is laughable? Would you know whether that's true or not?

A. No, I don't know that.

MR. SHEPHERD: Mr. Chairman, I arranged, because I hadn't been able to do anything dramatic in this cross-examination, I arranged to have a video brought in, and I've provided one copy of this video tape copy - I was told by Ms. Morrison you didn't need eight - to the Board. I understand that Hydro has this. I got my copy originally from them, so I assume they do, and I have advised Mrs. Formusa of what it is. It's a 30-second TV commercial, and I'm going to show it twice because you miss it the first time.

THE CHAIRMAN: This is av Ontario Hydro television commercial.

MR. SHEPHERD: An Ontario Hydro TV commercial, yes. Now, it will be a miracle if it happens the first time.

---VIDEO TAPE PRESENTATION

MR. SHEPHERD: Do you wish to see it again or is that enough?

THE CHAIRMAN: I don't need to see it again. I think I've already seen it.

MR. SHEPHERD: Q. Ms. Ryan, is it correct that this commercial was shown on prime time on major Ontario TV outlets for several months?

MS. RYAN: A. I assume so. That was the first time I had seen the commercial.

Q. Okay. Would you agree with the statement that wind energy is, in this commercial at least, treated as an object of derision? You can recharacterize it, if you don't like "derision."

A. I think you have to look at the point that is being put across, and I think it's fair to say to provide all of the power for the Province of Ontario, by wind energy, would not work. That is not to say that there is not a place for alternative technologies within the broader plan.

Q. Are you aware of whether major TV commercials like this are normally seen by and approved by senior management before their public release?

MR. SNELSON: A. I doubt whether anybody on this this panel is involved in any significant way with commercials of this nature. The purpose of this

commercial is to make people more aware, and this is my understanding from my own television watching, which I do from time to time, was to make--

Q. Not in the last month, presumably?

A. --people more aware of Ontario Hydro's energy management program and that this was -- would have been initiated or coordinated and produced in conjunction with our demand management branch.

So, the specifics of how advertising of this nature is done, if there's anybody who can speak to that, it would be on Panel 4. I'm not sure how much any one of those people is involved in advertising, as such.

Q. All right.

MS. PATTERSON: Did that answer the question though? Who does review commercials?

MR. SNELSON: The answer, as far as I'm aware -- my knowledge is that I don't know.

MR. SHEPHERD: Q. None of the other witnesses has any idea who reviews major commericals.

MS. RYAN: A. I assume it would be the line management of the group producing it and probably corporate relations to the dollar limit of their signing authority. But, I mean, that's just a general statement of the way things are approved.

Q. Now, you said that obviously you didn't think, and Hydro doesn't think, that wind energy is capable of providing all of the electricity that Ontario needs, and I guess even I might agree with that. I'm wondering though whether it's fair to say that Hydro does not see wind energy as, in any way, a possible grid-connected option, that is significant option, in the future; isn't that true?

A. I'm not in a position to answer that question. I don't know.

Q. Well, Mr. Snelson, isn't that right in the DSP?

MR. SNELSON: A. The DSP takes the view that grid-connected wind energy is unlikely to make a large contribution, which is not to say that it won't exist.

Q. I believe your plan, in fact, has zero in there for that, doesn't it?

A. We don't make a specific allowance for it.

Q. I would guess that the wind regimes in New York State are probably similar to Ontario? Is that probably about right?

A. I don't know enough about wind regimes in New York State to comment.

Q. So, as a systems planner you wouldn't be familiar at all with the activities of Niagara Mohawk in wind energy?

A. No, I'm not familiar with Niagara Mohawk's activities.

Q. Okay. I'd like to turn to the issue of Hydro's environmental standards. So far, all of the questions and answers we've been dealing with have dealt with environmental compliance; that is, where controls are forced on you by government.

So, for example, I think I understand you to say that your acid gas planning is based on the notion that you have to ensure that you are within the government-imposed emissions limits; is that correct?

MS. RYAN: A. Yes.

Q. That's the thrust of it?

A. Yes.

Q. There is no sense in which you're attempting to set a lower target and stay within that just because less is better?

A. For acid gas, we do set a target which is slightly below regulation. However, where we are able to do better, we do, and if there are not regulations, there are areas where we take action to make improvements within our business.

Q. I'm going to come back to that in a second. First of all on acid gas you set a lower target than the regulation only so you'll have a contingency margin, isn't that right?

A. Essentially.

Q. It's not because you think less would be better and it's a good idea?

MR. BARRIE: A. Just on one particular area, in 1989 and I think in '88, we did optionally decide to step down our acid gas, even though the legal requirement didn't require us to do that until 1990.

Q. Why did you do that, Mr. Barrie?

A. That was a presidential decree. He indicated that we should be stepping down our acid gas.

It was more than that. It was to demonstrate we could get there as well. We didn't want to be arriving in 1989 and have this massive reduction required between '89 and 1990.

Q. So, it doesn't sound like it was an environmental decision; it sounds like it was an operational decision?

A. I think it's true to say it was both. We were demonstrating that we could do it, but we were also demonstrating that we were prepared to go beyond the letter of the law.

Q. Now, currently, Hydro has no plans to set lower internal acid gas limits than the government regulation, does it?

A. That's my understanding, other than the allowance that Ms. Ryan mentioned.

Q. Yes. The margin for contingencies?

A. Right.

Q. And is that because, in fact, just meeting the regulated limits is hard enough, without having to make it tougher still?

A. I think it's consistent with our mandate to provide power at minimum cost and respecting all the laws.

Q. Well, let's come back to that because that's really where I was driving at anyway.

THE CHAIRMAN: I didn't hear the last part. You said "provide power at minimal cost..."

MR. BARRIE: While respecting all the laws of the province.

THE CHAIRMAN: I see. Okay.

MR. SHEPHERD: Q. We looked at a couple of examples the other day of situations, hypothetical, of course, that couldn't possibly happen. Situations where you wake up one morning in December to find that you're at your acid gas limit and you need to burn coal

plants and you've got a problem.

Let's look at the converse of that, which is that you find yourself in December, you've had a very good year, you're way below your acid gas limits, but in December you now need a fair bit of thermal. What is your operational response to that? Do you burn scrubbed coal or unscrubbed coal?

MR. BARRIE: A. We don't have any scrubbed coal.

Q. Sorry. Low sulphur coal or high sulphur coal?

A. Are you asking me in a historical context or future?

Q. Because that hasn't happened to you yet; right? I'm asking you what would you do if it happened this year?

A. Right now all of our fossil plant has low sulphur coal on the coal pile. So, we would burn low sulphur coal.

Q. All right. So, then you wouldn't have a decision in December as to whether to have dirty or cleaner generation; that's not an option that would arise?

A. If we are not in danger of impinging on the acid gas restriction, then acid gas essentially

does not become an operating constraint. We then revert to our normal, minimizing the cost of generation.

Q. You have an acid gas control plan though, which would typically have procedures in December, or any month for that matter, for keeping your acid gas low; right?

A. We have procedures that look at the annual acid gas limit and they guide our decisions on a month-by-month basis throughout the year.

Q. And when you get to the end of the year and you've got lots of room, then am I right in assuming that you don't follow any acid gas control procedures; you don't have to limit your gas? Is that right?

A. We do not have to alter our normal economic dispatch because of acid gas. So, yes.

Q. And isn't really what it boils down to then is that if -- and I guess what I'm trying to get at is this:

If you have room to dump a whole bunch of acid gas into the air in December, and doing that is the cheapest way to produce power, then economic dispatch is going to say, "Dump as much as you can into the environment as long as you keep within the limit;"

isn't that right?

A. I think I've got to bring you back to what's happening in practice, rather than this theoretical position.

In fact, our coal plant at Nanticoke and Lambton are our two biggest fossil producers. At Nanticoke we have mixed coal, western Canadian and low sulfur US, which gives us our -- that's our lowest sulphur content in southern Ontario. Nanticoke is our most efficient plant, our fossil plant.

So, in this context, minimizing economics is also the optimum for acid gas.

Lambton also has only low sulphur coal. So, we would tend to always want to burn Nanticoke and Lambton before Lakeview anyway, and it happens that both economics and acid gas are -- they're not in conflict with each other. The most efficient and cheapest plant is also the lowest polluter.

Q. And if they were in conflict with each other, then I understand your evidence to be that you would choose economic dispatch?

A. Providing they're within the lower, yes.

...

[11:23 a.m.] MR. TABOREK: A. Mr. Shepherd, if I just may add a point, we don't have a scrubber now, but we have scrubbers in construction, and the point you are addressing comes out very clearly in the case of using a scrubbed or non-scrubbed unit.

Q. There is a big difference in cost, right?

A. Yes, there is a big difference in cost, and we have decided that we would accept the cost of running the scrubbed unit instead of an unscrubbed unit, even if we are well below our emission limit.

Q. That sounds contrary to what Mr. Barrie just said.

A. No, no, Mr. Barrie mentioned non-scrubbers, and so I have given you, I think, a very clear example of the company reaction with respect to scrubbers.

Q. So, the rule then is going to be, once the scrubbers are in place, that you always burn the scrubbed coal first, notwithstanding whatever your acid gas limits are or however close you are, no exceptions, you always burn them first.

A. Yes, wherever possible.

MR. BARRIE: A. In our projections for future energy production from '94, '95, which is as far

as operations looks, we will be giving preference to burning the two scrubbed units at Lambton, yes.

Q. But then, Mr. Barrie, I understood you to say that your mandate is to produce power at the lowest possible cost within the law. And it sounds to me that what Mr. Taborek is saying is that you will spend extra money, even though you don't have to.

MR. TABOREK: A. No, within the law would allow us to preferentially dispatch the scrubbed units. It fits within that...

Q. Then you are not producing the lowest cost power, are you?

MR. BARRIE: A. I'm not sure of the exact figures, but the coal we will be burning in the scrubbers will actually be high sulfur coal and will be cheaper.

Q. Oh, so...

A. However, we will have lost some efficiency because of the scrubbed units, and I am not exactly sure where the saw-off is, as to how it will fit in strict economic dispatch.

Q. Well, I understood Mr. Taborek to be saying that you have a judgment that you burn the scrubbed coal first, and it is a lot more expensive, but you are doing it anyway.

A. It isn't a lot more expensive.

Q. I'm sure that is what he said.

Isn't that what you said, Mr. Taborek?

A. That is right. We have, as I'd said, we have conflicting forces here. We will actually be burning cheaper coal in a scrubbed unit, because it is high sulfur coal, and you have to pay a premium to buy low sulfur coal. So, the fuel itself will be cheaper. However, the actual cost of running the scrubber will have to be factored in.

Nevertheless, it is my understanding that when we have scrubbed units, we will run them preferentially to non-scrubbed units.

Q. You are not sure at this point whether that meets the test of economic dispatch or not.

A. That is my understanding. However, my panel members may know better than me. It is getting to the edge of the operating time frame.

Q. All right.

MR. TABOREK: A. The policy was developed on the assumption that it would cost more, because if it doesn't cost more, it presents no problem to anybody, I presume.

Q. The policy was also developed, if I'm

correct, on the assumptions that you would always have a problem with the acid gas limits anyway, so it wasn't really important, right? That is, it didn't matter whether you had such a policy, because year in and year out you are going to be really close to the limits.

MR. BARRIE: A. From 1994 onwards we will be close to the limit, because there is a further reduction in the statutory regulation. The limit comes down to 215 gigagrams from the present 280.

Q. So, am I right then that what this discussion boils down to is that my hypothetical is a silly one, because it could never possibly happen? You are not going to wake up one morning in December and find that you are way below the limit?

A. I think I pointed out previously in my evidence, there are so many unknowns between now and then, and the fossil burn is the swing fuel. So, there can be tremendous variations in the fossil burn and hence, the acid gas production.

But our present projection is that we will be under the limit in 1994 but not by a great amount.

MR. SHEPHERD: Mr. Chairman, I'm about to turn to the last series of questions I have in this cross. I wonder if this might be time for the break.

THE CHAIRMAN: I just want to make sure in calling the roll earlier this morning that if there is anyone here who was missed, or anyone who also wants to cross-examine we don't have on the list. Is there anyone?

MR. SHEPHERD: Mr. Chairman, I except I will be about 20 minutes after the break.

THE CHAIRMAN: So, that will be followed then by Mr. Power. You will be next.

MR. POWER: Yes, sir.

THE CHAIRMAN: Followed by Mr. Grenville-Wood.

THE REGISTRAR: This hearing will recess for 15 minutes.

---Recess at 11:29 a.m.

---On resuming at 11:50 a.m.

THE REGISTRAR: Please come to order. This hearing is again in session, please be seated.

MR. SHEPHERD: Q. Ms. Ryan, isn't it true, in fact, that under Hydro's interpretation of the Power Corporation Act, Hydro is obliged to prefer economic issues over environmental issues, under the stricture of power at cost? Isn't it true that when you can stay within the law environmentally, you are required to then make economic choices rather than

environmental choices?

THE CHAIRMAN: Is that a question of law you're asking the witness?

MR. SHEPHERD: I'm asking whether that is, in fact, how Hydro acts.

THE CHAIRMAN: Well, that is a different question. If you are asking does Hydro prefer cost issues over environmental issues, that is one question. But if you are asking what does the law require it to do, that is a different question.

MR. SHEPHERD: No, I'm only asking whether they act in a certain way because of how they understand the law to tell them how to act, which has nothing to do with whether the law, in fact, says that.

MS. RYAN: So, could you repeat your question for me?

THE CHAIRMAN: Perhaps you could do that, yes.

MR. SHEPHERD: Q. Under Hydro's interpretation of the Power Corporation Act, the concept of power at cost, is it not true that when you are within the law environmentally, you are then required to prefer economic decisions over environmental decisions?

MS. RYAN: A. I am not knowledgeable

about the Power Corporation Act. My understanding of how we do business is that environmental consideration is taken into account and does not necessarily result in the most -- I'll leave it at environmental consideration is taken into account, and it is not only economic.

Q. Just as an aside, you have no internal targets or plan to reduce CO(2) emissions, do you at Hydro?

MR. SNELSON: A. We compared in the Demand/Supply Plan, Exhibit 3, we compared ourselves against an illustrative target, and that was one of many factors taken into account in selecting the preferred plan.

Q. The one area in which you have testified that have you set much tougher limits than the regulations, is in the radioactive emissions from your nuclear facilities. If I understand your evidence, Ms. Ryan, Hydro's internal standard for radioactive emissions from nuclear facilities is one per cent or less of the regulated standard.

I'm going to quote to you, you have referred to this as:

"An example of where we do far better than the law, is for our radioactive

emissions from our nuclear stations."

Is that correct, you have an internal standard that is one per cent of the required standard?

MS. RYAN: A. Yes, an operating target, that is correct.

Q. I'm going to ask you to take a look at Exhibit 159, filed on Wednesday, and this contains two excerpts, one from the "Bruce "B" Operating Policies and Principles," which is a Hydro operating document, as I understand it; and the second, an excerpt from the operating licence of Bruce.

I'm going to ask you to turn to the last page of that, which is from the policies and procedures, and it says, under the heading "Radiation Protection Regulations," it says:

> "If emissions regularly or significantly exceed one per cent of the derived emission limits" and that is the legal standard, right, "the need for and the practicality of modifications to equipment and/or procedures will be reviewed."

And then I'd like to take you to the previous page. Now this is an excerpt from the actual licence that allows you to operate Bruce "B", correct?

A. Yes.

Q. And I'd like you to look at A.A.1.

THE CHAIRMAN: Sorry say, I didn't pick that up.

MR. SHEPHERD: This is page 3 of the exhibit, which is headed up "Attachment A.A to licence No. 14/89," and I'm reading from general requirements No. A.A.1.

Q. Where it says:

"Operation of the nuclear facility shall be governed by and be in accordance with the document entitled 'Operating Policies and Principles...'"

et cetera, which I assume is the other document that we just quoted from, is that correct?

MS. RYAN: A. I assume so. It doesn't have the number on your excerpt.

Q. If I read this right, it looks to me that for all practical purposes the one per cent limit is in fact a licence condition, isn't it?

A. My understanding of what that means is that the AECB condones our operating practice of keeping emissions to one per cent of the regulated limit and would require us to discuss it with them if our practice were to be different than that.

Q. Isn't it, in fact, true that the operating -- what is it called? The "Operating Policies and Principles" document is negotiated with the AECB prior to the licence application? Isn't that correct?

A. I don't know.

Q. Isn't it also correct that there is an AECB regulation, principle, if you like, that is stated to transcend all other specific regulations that says that you will operate a facility to minimize emissions to the lowest possible level you possibly can, given the design of the facility? Isn't that true?

A. I'm not familiar with that exact phrase, and I don't know exactly where it is taken from.

Q. Is there a general AECB principle that says something to the effect that you can ignore the regulations and the specific rules, because we really want you to work to a tougher standard than that, whenever you can?

A. I'm not familiar with the specific document that you are referring to.

THE CHAIRMAN: Are you familiar with the principle?

MS. RYAN: I'm familiar with the principle of ALARA, which is "as low as reasonably achievable," yes.

MR. SHEPHERD: Q. And that is an AECB principle?

MS. RYAN: A. It is a nuclear generation principle, yes.

Q. Isn't it also true that this general requirement, A.A.1 in your licence, is the way the AECB makes that principle a binding rule on Ontario Hydro?

A. I believe my point was that we meet one per cent of the regulatory limit, which is the derived emission limit, and I hear what you are saying, but I can't agree with your interpretation.

...

[12:00 p.m.] And the fact that the AECB is in the process of changing the regulation under consultative Document C83, which has been an ongoing process, and are looking at reducing the regulated limits, is consistent with what I have said.

Q. I am not sure I was asking about future changes.

What I am concerned with is, certainly I got the impression, and maybe it is just me, but I got the impression from your previous evidence that you were saying that Hydro sets a voluntary standard.

A. They did in the early '70s.

Q. But the standard you referred to, the one per cent, is not a voluntary standard; is it?

A. It was initiated as a voluntary standard and the AECB has now indicated that they like that standard and so have attached it to the licence.

Q. So, when I got the impression that Hydro's current practice is a voluntary one, I was just misunderstanding your evidence?

A. I don't believe so. My intent was that it was initiated voluntarily, and we still maintained that level of emission.

Q. I see. So, there was no ALARA principle in the 70s?

A. It's been around for a long time. I don't know when it was initiated.

Q. But I understand your evidence today to be - please correct me if I am wrong - I understand your evidence today to be that when the one per cent was initiated, it was purely voluntary Hydro's part. It is now no longer voluntary but that doesn't change the point that it was voluntary at the outset; is that correct?

If you don't know whether it was voluntary at the outset, please say so, because I am going to come back to it in future evidence. I am not trying to catch you out. I just want to know what the fact is.

A. My understanding was that it was an Ontario Hydro operating target set in the early 70s.

Obviously, in establishing the requirements for a given facility, there would be discussions with government. I don't know what took place in those.

Q. Now, I guess my last question is, can you give us any examples where Hydro currently has a voluntary standard that is lower than regulated standards, currently?

A. We have a number of programs

underway, I guess one is the reduction of herbicide usage in right-of-way management.

Q. Okay. That is a good example. Isn't it true, in fact, that when that came up, that came out as a result of negotiations between Ontario Hydro and the Ministry of the Environment, in which the Ministry of the Environment was proposing regulations and Hydro said they would comply voluntarily; isn't that true?

A. That is not my understanding of how it was initiated, no. I know nothing of that.

Q. It was totally voluntary on Hydro's part?

A. It was a president's initiative several years ago, yes.

Q. Are there any other examples that you know of?

A. Our reforestation and tree replanting programs where we have an agreement with the Ministry of Natural Resources to reforest equivalent areas of land that we use for new transmission.

Q. That's not voluntary either, then. It's an agreement with the Ministry.

A. I guess it depends on where you look at the start point. And again it was a president's initiative. Obviously, the Ministry of Natural

Resources were in favour of it. But, I don't think it's a regulatory requirement, if that's what you are saying.

Q. All I am trying to get at, Ms. Ryan, is the extent to which Hydro, in fact, today sets its own internal standards just because it feels it's right and lives within those standards rather than the standards imposed by external agreements, by licences, by regulations, et cetera. I am just looking for some examples where Hydro has a different standard, a tougher standard.

A. I have given you two examples.

MR. SHEPHERD: I have no further questions, Mr. Chairman.

MS. RYAN: Just a minute.

MR. SHEPHERD: Sorry. I have no further questions, Mr. Chairman.

THE CHAIRMAN: Thank you, Mr. Shepherd.

Mr. Power, you are next.

MR. POWER: Thank you, Mr. Chairman.

THE CHAIRMAN: On behalf of the South Bruce Economic Division; is that correct?

MR. POWER: Yes, sir.

Mr. Chairman, as the Board may know, South Bruce is interested in Ontario Hydro taking a

full energy development approach rather than an electrical generation approach, and we are specifically interested in how existing assets can be used to generate energy forms other than electricity.

One of the problems we have run into, it's a small one, and I believe Mrs. Formusa agrees, is that none of the witness panels, as presently set up, can address in the detail we wish how best to deal with this.

So, as a result, Mrs. Formusa and myself have agreed that I will ask general planning questions today, we are going to go away and decide where best a later panel can address these issues, and as a result interrogatories asked of this panel will be laid over to that panel and we will advise when we know we can bring these on at a later date.

MS. OMATSU: We are not able to hear back here.

---Off the record.

THE CHAIRMAN: Is that your understanding too, Mrs. Formusa?

MRS. FORMUSA: I think it's fair to say that we want to speak with Mr. Power to determine which panel would best address the concept that he is proposing. It's not that there isn't anyone there to

deal with it, we are just not quite sure who is best able to deal with it. So, we are going to sit down with him afterwards and go through the details of the matters he is interested in and decide which panel would be best able to address his issues.

THE CHAIRMAN: I'm sorry, Mr. Power, I was just getting organized. I am not quite sure I quite understand what your issues are that you think are not dealt with by the future panels.

MR. POWER: I guess there are two levels to this. First is that these particular technologies can be applied to different types of generating stations, fossil, nuclear and hydroelectric. So, the first issue is whether we have to reattend every panel just to sort of do a little bit in each segment, or can we work out with Ontario Hydro a place where we come and in one, sort of, quick forum resolve all those questions rather than come back.

And secondly, I think we agree, while Ontario Hydro has witnesses, perhaps they haven't got one identified who can best deal with these issues, one person.

THE CHAIRMAN: The issues being?

MR. POWER: How Ontario Hydro can cogenerate through their own assets, their own

generating stations, not just electricity but other energy forms such as hydrogen and thermal energy for consumer use and for use as a fuel for themselves.

There is a brief offhand reference to it in, I believe, Panel 7, the purchase options, but it hasn't been explored in detail yet.

THE CHAIRMAN: So, it's that Ontario Hydro would produce other forms of energy other than electrical energy; is that right?

MR. POWER: Yes, sir.

CROSS-EXAMINATION BY MR. POWER:

Q. Just to make it clear, because I know there is some variation in the use of the term "cogeneration", I will be using it in the context of Ontario Hydro utilizing its own generating stations to produce energy forms in addition to electricity, the two that I mentioned I am going to focus on are hydrogen and thermal heat, thermal heat including steam.

I believe, Mr. Snelson, that most of these questions may be best addressed to you and correct my if I am wrong.

In preparing the Demand/Supply Plan, did Ontario Hydro study the potential additional energy that can be utilized through hydrogen at the existing

Ontario Hydro generating stations?

MR. SNELSON: A. Not specifically.

Q. How about for cogenerating thermal heat at Ontario Hydro generating stations?

A. Not as part of the DSP process.

Q. And the plan itself does not refer to either of these energy forms as serving the perceived demand in the future context?

A. No, it does not refer to them.

Q. Are there any studies presently underway by Ontario Hydro regarding the application or use of hydrogen as an energy form or as a fuel by Ontario Hydro?

A. Hydrogen is a fuel that might be considered for fuel cell application.

THE CHAIRMAN: For what application?

MR. SNELSON: Fuel cells.

I believe the focus of our effort in the area of fuel cells, however, is more on natural gas as a fuel for fuel cells.

MR. POWER: Q. So, your focus is not on hydrogen?

MR. SNELSON: A. That's correct.

Q. Do you have any studies specifically underway looking at hydrogen or any aspect of a study

looking at hydrogen?

A. I am not aware of any in recent years.

Q. How about for cogenerating thermal heat at Ontario Hydro generating stations?

Are there any studies underway involving this?

A. I am not aware of specific studies underway. There may be some implications of cogenerating heat associated with proposals for Hearn generating station.

Q. Is that a specific study that's presently underway?

A. There have been proposals for Ontario Hydro to generate steam for the district heating system, the downtown Toronto heating system at Hearn, which are currently not active.

I understand that there are non-utility generation proposals for developments at Hearn which may very well involve the supply of heat to the distribution heating system.

Q. With respect to the City of Toronto district heating system, was it the City that approached Ontario Hydro regarding that matter, or did Ontario Hydro make it available, known generally, that

they would be willing to cogenerate thermal heat at Hearn?

A. I am not sure of how an approach was made to the City of Toronto. Ontario Hydro did produce a brochure from its New Business Ventures Division on the supply of heat from existing generating stations.

Q. But you do not know whether Ontario Hydro took the initiative, if I may, and went to the City and said, "We are willing to develop a program for your benefit," as opposed to the City approaching Ontario Hydro?

A. I don't believe Ontario Hydro has done that recently. The most recent proposals come from a non-utility generator and the dealings between him and the city are things that I am not privy to and I am not sure whether anyone in Ontario Hydro is privy to.

THE CHAIRMAN: This brochure was related to Hearn, was it?

MR. SNELSON: No, it was related to all our thermal generating stations, including Hearn.

MR. POWER: Q. Is it possible that I could get a copy of that brochure, please?

MR. SNELSON: A. Yes.

MRS. FORMUSA: That's 142.59.

---UNDERTAKING NO. 142.59: Ontario Hydro undertakes to provide brochure from New Business Ventures Division on the supply of heat from existing generating stations.

THE CHAIRMAN: What generally does this brochure say, in general terms?

MR. SNELSON: I haven't looked at it for a while. It, in general, alerts people to the fact that it is possible to extract steam from the turbine generating systems at existing thermal generation plants and indicates, I believe, that we are open to proposals related to that.

MR. POWER: Q. What is the date of that brochure, do you know?

MR. SNELSON: A. Several years ago. I couldn't put a date on it.

Q. Ten years ago?

A. More recently than that.

...

[12:15 p.m.] A. More likely in the order of five years ago, but three or eight -- in that order.

Q. In preparing that brochure, do you know if Ontario Hydro completed any studies regarding thermal energy being made available for consumer use?

A. Over the years we've had a number of discussions with specific proponents with regard to the sale of thermal energy from your generating stations.

Q. I guess one of my questions is: Has Ontario Hydro completed on overall study regarding making thermal energy available throughout the Province of Ontario at its generating stations, and has it developed that into a program, whereby, it's made this known to the public generally?

A. Basically thermal energy can only, economically, be transported relatively short distances. And so, the opportunities for the use of thermal energy from exisitng plants is limited to a fairly small radius around each plant.

Q. So, have you gone to the business communities around each generating plant? Has Ontario Hydro gone to these communities and made it known that this energy form is available for business use?

A. I believe this was one of the objectives of our New Business Ventures.

Q. Do you know whether they have done that specifically?

A. I know of their brochure. What activities they have undertaken in following up after that, I'm not familiar with.

Q. I don't suppose you could undertake to find out which communities Ontario Hydro has specifically approached with this information and advised them as to the availability of the thermal heat?

A. I can undertake to find out what information is available in that area. I don't know of the specifics of what's available, so I'm not quite sure what I'm promising to provide.

MRS. FORMUSA: I still am uncertain of where we're going with this area of thermal heat. Mr. Power and I have been discussing over a number of months, since intervener funding, and I think both I and the people at Ontario Hydro are still unclear as to the relationship with respect to this form of energy and the Demand/Supply Plan, other than it makes another use of our existing facilities.

And it would certainly be helpful, I think, in terms of our being able to provide information to know where we're going with this. It's

still unclear to me, and I gather from Mr. Snelson's comments, it's unclear to him as well.

MR. POWER: Q. Just very generally, the South Bruce position is that Ontario Hydro has a capacity to produce energy in this province that isn't being met because Ontario Hydro has focused solely on electrical generation, and that if Ontario Hydro would take the incentive, and, for instance, I think it's agreed that there's a certain amount of thermal heat available at any generating station, fossil fired or nuclear, in Ontario. If they made that known to business communities and worked with business communities, that they'd be able to meet a certain amount of electrical demand through providing thermal energy, an alternative energy source.

So, they have a potential to meet energy demand through supplying this alternative energy source that we would submit is not being met right now, and that if Ontario Hydro made it well known that this is a program available, they can meet some of the projected demand, as well as, I think we'll demonstrate at later panels, provide significant environmental savings overall by pursuing such a program.

So, my specific questions are to try and understand what Ontario Hydro has done to date in terms

of providing these type of programs to the community, but not just letting the energy forms sit there, but activity going out to the community and saying, "This is available. We will work with you." And educating the community as to its availability. Is that --

MRS. FORMUSA: Well, again, in the context of this application, which is to consider how we're going to meet requirements for future electricity needs of the people of Ontario, we're talking about electricity needs. There may be spin-offs from production of electricty whereby one could make more efficient use of facilities or technologies that are developed. But it's still unclear to me how it relates to the application. Maybe I'm missing something.

THE CHAIRMAN: I thought that I heard Mr. Power say that if this type of energy was made available, that would reduce the demand for electrical energy.

MR. POWER: To some degree, yes, sir.

THE CHAIRMAN: To some degree. So, to that extent, that would be relevant.

MRS. FORMUSA: Then I think that kind of questioning should perhaps be put to the witness and we can explore that issue. I hadn't understood it as that.

MR. POWER: I think at this point I was just trying to get a general sense of what Ontario Hydro has done.

THE CHAIRMAN: But we do know whatever studies there have been, they felt confident enough about it to produce a brochure and do some negotiating and, presumably, some selling efforts.

MRS. FORMUSA: Well, to the extent that we've offered to produce the brochure, perhaps we can, in the context of that undertaking, investigate what New Business Ventures division has undertaken in terms of the distribution of that brochure and discussions with communities surrounding our existing facilities. We can undertake to make those inquiries of that division. Would that be --

MR. POWER: Yes. That would be appreciated. Thank you.

MRS. FORMUSA: And we'll include that under 142.59 with the brochure.

THE CHAIRMAN: All right.

MR. POWER: Q. If I can back up then, Mr. Snelson, other than the brochure and perhaps any communications with communities in the Province of Ontario, are there any studies then, in essence, underway utilizing thermal heat in Ontario specifically

for that purpose?

MR. SNELSON: A. I'm not aware of any current studies.

Q. Would you undertake to review with whoever the appropriate persons is and find out, please?

A. Yes.

Q. And the same with hydrogen. Do you know if there any any studies presently underway in Ontario by Ontario Hydro or through consultants studying the use of hydrogen as an alternative energy form?

A. I believe there have been such studies in the past, but I don't know of any today.

Q. Okay. Would you undertake also to find out from the appropriate person whether that is occurring?

A. Yes.

THE CHAIRMAN: I take it there were thermal studies in the past as well?

MR. SNELSON: Yes, and there are also thermal uses in use today?

THE CHAIRMAN: Thermal uses in use today?

MR. SNELSON: Yes.

MR. POWER: Yes, sir. We'll be getting

to that soon.

MRS. FORMUSA: Is that going to be 142.60? Can we combine both thermal and hydrogen?

---UNDERTAKING 142.60: See undertaking front of transcript.

MR. POWER: I think that's reasonable. So, 142.60 would be to find out if any studies are underway for both thermal heat and hydrogen and to please produce them or some information about it, please.

Q. Mr. Snelson, do you know if Ontario Hydro presently has any employees dedicated specifically to studying the use of hydrogen or thermal heat at Ontario Hydro generating facilities?

MR. SNELSON: A. No, I don't know.

Q. Would you also undertake to find out who or how many, please?

A. Should we add that to the previous undertaking?

Q. Sure. I guess that would be part of 142.60.

Are you aware of how much money Ontario Hydro would have spent in the last five years investigating hydrogen or thermal heat?

A. No. Hydro has been involved in the

Bruce Energy Centre, which I'm sure you're familiar with.

Q. Yes, sir.

A. But I am not familiar with the amounts of the money that have been spent.

THE CHAIRMAN: Is that the Bruce Energy Centre?

MR. SNELSON: Yes.

MR. POWER: Yes, sir.

THE CHAIRMAN: And what is the Bruce Energy Centre?

MR. POWER: We will be getting to that also shortly, sir, if I may delay that.

In essence the Bruce Energy Centre is an industrial park located near the Bruce Nuclear Power Development, which utilizes steam which occurs from the generating facilities at Hydro as an alternative energy for industry located there.

MR. POWER: Q. So, you have undertaken, I believe, to find out roughly how much money in the last five years for both hydrogen and thermal heat studies by Ontario Hydro?

MR. SNELSON: A. Yes.

Q. Would you know who in Ontario Hydro would make the final decision both to explore the use

of these energy sources and to decide whether to pursue them in the context of the 25-year Demand/Supply Plan?

A. The highest level of decision on the Demand/Supply Plan, in total, in Ontario Hydro is the board of directors.

Q. Do you know if they have these two energy sources referred to them for their consideration?

A. Not to my knowledge.

Q. Okay. I just have a couple of questions regarding Ontario Hydro's involvement with other utilities or boards, et cetera, for these energies.

Do you know if Ontario Hydro has representatives involved with any international boards or associations investigating the use of hydrogen or thermal heat?

A. I don't know.

Q. I don't suppose we can undertake to find that out?

A. Yes.

Q. I don't know if we just want to add these two.

MRS. FORMUSA: In the interest of keeping the numbers down, I would happy to include it in

142.60.

MR. POWER: Okay. I think that's the easiest way to go.

Q. Independent of the international boards or associates, do you know if Ontario Hydro has any liaisons with any government investigating the use of hydrogen in Canada or in the world?

MR. SNELSON: A. There has been some form of government study, I believe chaired by a professor previously of the University of Toronto, and I understand that Ontario Hydro did contribute to that, but the specifics of that, I'm calling back materials I've seen some time ago. I'm not very clear on the details.

Q. Do you have any of the date of that study?

A. In this general area there have been ongoing studies for a number of years. The specific one that I'm referring to is probably in the order of three or four years ago.

Q. Would you undertake to please find out which study that is?

A. Yes.

Q. I guess the same considerations for thermal heat. Do you know if Ontario Hydro is working

with any utilities or governments to investigate the use of thermal heat?

A. I'm not aware of any.

Q. Would you undertake to find that out as well, please?

A. Yes.

Q. Are you aware of any countries presently using thermal heat whereby they take generating stations, provide electricity to consumers, but also provide the thermal energy to the consumers in the area?

A. You're referring now to co-generation in a general sense?

Q. Yes.

A. And there are examples world-wide of either an electric utility owning a generating plant and selling thermal energy, or an industrial corporation or other entity who wants to use steam owning a combined steam and electricity plant and selling electricity to the utility.

Q. Correct.

A. And it works both ways.

Q. So, there are examples world wide?

A. Yes.

Q. But we're not doing that in the

Province of Ontario with the exception, I believe, of the Bruce Energy Centre?

A. We're doing it extensively in the form of the user of steam also being a generator of electricity, and that is a large part of the exisiting non-utility generatation that there is in the province today.

Q. Okay.

DR. CONNELL: Could I just interrupt for a moment? The use of the term "thermal heat" seems redundant to me.

MR. POWER: Sorry. It should probably be thermal energy, I believe, identifying that type of energy. You're quite correct.

DR. CONNELL: Thank you. It's a bit like talking about wet water, isn't it.

MR. POWER: Yes, sir. My apologies. My references should have been to thermal energy.

DR. CONNELL: Thank you.

MR. POWER: Q. I have a couple of questions regarding the Bruce Energy Centre and the Bruce Nuclear Power Development. You're familiar with the Bruce, I take it, Energy Center and its relationship with the Bruce Nuclear Power Development?

MR. SNELSON: A. In general terms.

Q. The Bruce Energy Centre, as I indicated, is an industrial park. You're aware that there is a pipe which transmits steam from the power development to the Bruce Energy Centre for use by industries in the Bruce Energy Centre?

A. Yes.

Q. Do you know when this steam pipe was constructed?

A. About 1983 or '85, somewhere in that region.

Q. Roughly in there.

A. I'm just recalling that.

...

[12:29 a.m.] Q. And it is still operating today, I believe, isn't it?

A. I believe so.

Q. In designing and constructing the Bruce Nuclear Power Development, Ontario Hydro did not originally plan that the generating stations be used for cogenerating steam, did they?

A. Yes, they did. They did plan on generating steam as well as electricity.

Q. But plan on generating steam for the purposes of sale to consumers?

A. No, they planned on generating steam for the purpose of generating heavy water.

Q. Correct. So, 25 years ago, for instance, Ontario Hydro wasn't thinking of taking that steam and selling it for consumer use. That was not the intent.

A. At Bruce, no.

Q. So, the steam line is, in effect, an afterthought modification of the existing facility?

A. In this case, yes.

Q. Do you know upon whose initiative the steam line was built? Was it Ontario Hydro going to the community or the community approaching Ontario Hydro?

A. I don't know.

Q. I believe it was actually the community pursuing Ontario Hydro, but if you wish to clarify that or undertake to find out?

THE CHAIRMAN: Well, isn't that within the knowledge of your own client.

MR. POWER: Yes, sir. I don't think there is any disagreement. I think that the community actually approached Ontario Hydro, and over a number of years finally reached an agreement with Ontario Hydro to build a pipe.

Q. Other than the Bruce Energy Centre, is there anywhere else in Ontario where steam is created at Ontario Hydro generating stations or is made available for consumer use and is used for consumer purposes?

MR. SNELSON: A. Steam, no; warmed water, yes.

Q. Is that Darlington, I believe, the fish farm?

MS. RYAN: A. Pickering.

Q. Sorry, Pickering, correct. But no steam.

THE CHAIRMAN: Warm water for what? I am sorry.

MS. RYAN: For a fish farm. Essentially they raise fish for sale, and Ontario Hydro provides the warm water to cool water ponds.

MR. POWER: Q. Is hydrogen technology presently being applied in any form at any nuclear fossil or hydro electric generating station in Ontario?

MR. SNELSON: A. Not to my knowledge, no.

Q. It isn't, is there?

A. Well, hydrogen as a form of energy, no. Hydrogen is used for various purposes in generating plants.

Q. No to that, as well, or yes.

A. Well, hydrogen is used for cooling.

Q. Okay, but as an energy form, no. We agree it is not being used as an energy form or other energy use.

A. It is not being used as an energy form.

Q. If I may, I just have a couple of questions regarding the future plans of Ontario Hydro to investigate these matters. Do you know if Hydro plans, in the next ten-year context, for instance, to initiate a program to study the use of hydrogen?

A. Apart from its use in fuel cells,

which I have referred to, I don't know of any current programs or proposed programs with respect to hydrogen.

Q. Same question for thermal heat. Do you know if any proposed programs in the next ten years?

A. I have mentioned the Hearn situation.

Q. Yes. In addition to that?

A. I believe that their people are still actively seeking new steam customers for the Bruce Energy Centre.

Q. Is Ontario Hydro actively seeking those customers?

A. I'm not familiar enough with the institutional arrangements to know who is taking the lead in that regard.

Q. Are you aware of any programs that Ontario Hydro may be commissioning internally or externally to study hydrogen or thermal heat?

A. No.

Q. Is there any money set aside that you are aware of generally, even though programs haven't been set up, to study use of hydrogen or thermal heat?

MS. RYAN: A. I believe our association with the Canadian Electrical Association, there are research and development committees there where

research in Canada provides money to the committees, and the generation committee has an alternative energy technology committee, which is just formed, and is looking at the use of thermal energy within Canada.

Q. Just formed within the last year or so?

A. The committee has been ongoing for a long time, but they established a specific work group about a year ago to look at that, yes.

Q. It is not just hydrogen, or I am sorry, not just thermal heat they are looking at.

A. Alternative energies in general.

Q. Alternative energies in general.

A. Yes.

Q. That is an association Ontario Hydro has and a specific program they are undertaking?

A. That is correct.

Q. Do you know if Ontario Hydro has a policy generally regarding the use of hydrogen, exploring it, anything to that effect?

MR. SNELSON: A. I believe Hydro was party to quite a number of studies on the use of hydrogen, mostly in the late 1970s. And that the general line of conclusion that came out of the discussions at that time was that with current fossil

fuel prices, hydrogen is most economically made by other sources, such as the reforming of natural gas, and that the so-called hydrogen economy is not all that economical under current conditions.

Q. Those decisions arose out of work undertaken in the 1970s you had said?

A. I believe that there was a fair amount of discussion of it in the late 1970s.

Q. It seems to me that, overall, Ontario Hydro has not pursued any to great detail or investigated to any great detail the use of hydrogen at existing generating stations in Ontario. Would you agree with that? In the last five year context, let's say?

A. I believe we have not pursued the development of hydrogen at existing generating stations. And that to produce hydrogen at existing generating stations would reduce the amount of electricity they could generate and would not be an economical form of hydrogen generation.

Q. That may be, but you do agree then that in the last five-year context, Ontario Hydro has not invested a large amount of resources in studying the application of hydrogen?

A. To my knowledge we have not invested

a large amount over the last five years.

Q. And to your knowledge Ontario Hydro does not intend to invest a large amount of resources in the next ten years to studying the application of hydrogen at Ontario Hydro?

A. To my knowledge we are not proposing major investments in hydrogen development.

Q. It seems to me - correct me if I'm wrong - the same can be said for thermal energy, in terms of there is no program mandated to explore how it can be applied in Ontario Hydro generating stations with any large amount of resources to invest into it?

A. The sale of thermal heat, thermal energy, excuse me, from existing generating plants is part of the mandate of our New Business Ventures Division, and the degree to which they are actively pursuing that, at the moment, I'm not familiar with.

MR. POWER: Mrs. Formusa, can we find out the degree to which the business developments group is actively pursuing thermal heat, as part of the last undertaking?

MRS. FORMUSA: I'm hesitating, because I'm not sure how one measures that degree. You have asked about funds being allocated.

MR. POWER: I'd be interested in funds,

number of employees or individuals dedicated to exploring these uses, and any consultants retained to advise as to how thermal energy could be applied or used in the next ten years at Ontario Hydro stations.

MRS. FORMUSA: Why don't we put that within the scope of 142.60, then? I think it is all-embraced in there.

MR. POWER: Mr. Chairman, those are all my questions.

THE CHAIRMAN: Thank you, Mr. Power.

Next is Mr. Grenville-Wood.

MR. GRENVILLE-WOOD: Mr. Chairman, thank you, Members of the Panel.

First, I would like to put a hypothetical to Mr. Snelson, if I may.

CROSS-EXAMINATION BY MR. GRENVILLE-WOOD:

Q. Mr. Snelson, I'd like you to assume that your planning department, or possibly even another potential hypothetical situation, that the government of the day instructs Ontario Hydro that the load forecast must be met within the existing system.

Now, given either one of these scenarios, either that your planning department says load forecasts can't be met, or the government tells you, "Look, you've got to live within the existing system,"

what would you do to extend the life of this system? What kind of steps would you embark upon to attempt to meet the load forecast, or at least to extend the system to put the load forecast into better balance?

MR. SNELSON: A. It is a little hard to respond to a hypothetical, when one doesn't really understand the circumstances that have led to the hypothetical. I'm not sure how one manages a system with an overriding rule that you can't build a new generating plant.

Q. Well, that is the hypothetical I'm putting to you. The Premier tells you tomorrow morning, "Well, sorry, you are not going to have any more generation facilities," what would you do? You've got to manage the existing system. What steps would you take?

A. Measures to reduce demand, which are already built into the plan, one would have to look to see whether there were ways in which more could be achieved in that regard. Presumably, in doing so, again, depending on the reason for the initial prohibition, one would have to consider how economics would be reflected into that sort of decision making.

We have now postulated a rule, a world where there is an arbitrary exogenous rule imposed upon

it, and I am not really sure, without knowing how this comes about and what the reason for it is, exactly how I would respond.

Q. Well, you have given me one area that you would be working on. That would be demand management. What sorts of things would you focus in on then?

A. As I have said, we already have a demand management program. I'd be seeking --

Q. I would presume you'd have to improve upon it, because it doesn't achieve the objective of living within the system.

A. One would have to seek additional measures. Whether that is an improvement or not I don't know, because those measures might very well be at higher cost than adding new generating facilities.

Q. What sort of measures would you be talking about then?

A. In our demand management program, we are seeking to pursue opportunities for improving the efficiency of use of electricity that are less cost than adding new generating facilities. Presumably one would have to then seek opportunities to improve the efficiency of electricity use at a higher cost than adding knew generating facilities. ...

[12:45 p.m.] Q. You are making an assumption that there may be a higher cost.

A. Our objective, at the moment, is to pursue opportunities that are lower cost than new generating facilities.

Q. All right. Now, let me see if I understand what you are saying. Are you saying then that, within the existing system, the possibility that you may be required to live within its parameters is not a contingency that you have set up any plans to deal with?

A. We have tried to develop a set of plans under the circumstances that we currently face.

Q. I'm sorry?

A. Under the circumstances as they currently are.

Q. Yes?

A. Which is that when it's seen to be the most environmentally and socially and economically desirable way to proceed, to add new generating facilities, then we would add new generating facilities.

Q. I am still not completely understanding you, but maybe that is my fault. I am just trying to see if I can understand whether, within

your present planning, there is a contingency that you may be told for some reason or another, maybe it's an economic reason, maybe it's a political reason, maybe it is just an internal reason that your planners say "We can't do it," that within your present system there is no contingency allowed for that says you have to live within your means. Now this is what you have got, this is what you have got to live with. Is that a concept that is totally foreign to you?

A. There is no explicit plan made on the basis that there is a prohibition of adding to the existing system.

Q. All right. So, I presume then the answer is no, you don't have that contingency built in.

A. We did look at the reliability of the system with the forecast load and how that would change, assuming that no additional facilities were added.

Q. And what did you conclude?

A. That the reliability would rapidly deteriorate.

Q. Reliability would deteriorate?

A. Yes.

Q. In what areas, in what way?

A. More frequent inability to supply the

full electricity demanded by our customers.

Q. I understand that, but let's be more specific, please. Like what?

A. I believe it's described in the plan analysis, Exhibit 6.

Q. Could you just tell us what it says there, please?

A. On page 3-17 of Exhibit 6, figures 3-7A and 3-7B, show the system reliability without new capacity additions. 3-7A shows it in terms of unsupplied energy measured in system-minutes and shows a rapid deterioration after the year 2000, without additional capacity. Figure 3-7B shows the situation in terms of reserve margin, which shows a decline in reserve margin, taking place in the late 1990s and early 2000s.

Q. Now, this deterioration is in which particular modes of generation?

A. This is a decline in reliability of the generation system as a whole.

Q. So, it doesn't break it down into areas or modes of generation? It is just across-the-board?

A. This is a measure of when the system, in total, is unable to meet the total demand put upon

it.

Q. And if presumed then that you have got come to that conclusion, that by the year 2000 there will be, what you call, rapid deterioration, what measures have you got in mind of looking then to alternative sources of energy or alternative technologies to meet both contingencies, one is the reserve margin problem and the other is the generation problem? What plans have you got for other sources of energy?

A. Well, first of all, it's one problem. There are two facets of the same problem. Reserve margin declining leads to increasing unsupplied energy. There are a variety of alternatives to meet that situation, which include demand management, non-utility generation, purchases from other utilities, and generation construction by Ontario Hydro including possibly hydraulic, nuclear or fossil facilities or other forms of generation.

Q. I was posing a particular question to you and maybe I wasn't making it clear.

Again, playing with this hypothesis a little bit. What other modes of technology have you looked at in terms of maintaining the existing system but yet, either reducing demand or producing energy

through other sources, to give you the specific example of solar?

A. You told me that part of your hypothesis was that we weren't allowed to build new generation.

Q. Yes. So, then could you could look at other technologies that don't require new generation in terms of new major facilities.

A. I am sorry, I misunderstood or misheard your question.

Q. All right. I will repeat it for you.

The point is this: The hypothesis I put to you is that, for some reason or other, let's say the government tells you you have to live within the existing system, and what they mean is you can't build any new facilities to generate electricity. So, then you say, your number of contingencies you can put into place. I am asking you, within those contingencies, what aspect or what part do you allocate to the use of other technologies to either dampen down demand or, on the other hand, produce energy?

A. I am not sure I am answering your question here because I am not sure I fully understand your question.

Q. Please ask for clarification. I am

here to clarify.

THE CHAIRMAN: I take it you mean that it's new technologies that would not involve the provision of new generation facilities; is that what you mean?

MR. GRENVILLE-WOOD: Precisely, Mr. Chairman. I mean, you don't have to build a new dam, new nuclear plant, new fossil fuel, or anything that have nature. I am talking about technologies that can produce power without any new major facilities.

MS. PATTERSON: What you are trying to avoid is major new generating facilities rather than perhaps new small new generating facilities, or no new generating facilities.

MR. GRENVILLE-WOOD: Q. What I am trying to address here is the existing system has certain parameters to it and certain capacities. Now, within that system one can contemplate generating electricity from either what we do now in certain remote areas, or through the generation of very small alternative generating facilities. But I am talking about no major new facilities. If you want to use the word "major", if that would help, that is certainly a way of closing the gap.

MR. SNELSON: A. As I understand it

then, the prohibition is now on major generating facilities but permits some small generating facilities; is that correct?

Q. Well, that's what I finished saying.

A. Perhaps I am not quite sure what is included in the class of small generation facilities.

Q. Let's not nitpick, Mr. Snelson. You know what I am trying to say, try and answer the question.

MRS. FORMUSA: In fairness, we started off with a hypothesis which, in my view, radically alters the Environmental Assessment Act.

What we are taking about here for the existing system is a no alternative. What do you do if you do nothing? That's what Panel 2 is all about. That's what Chapter 4 is all about. The Act requires us to look at it. What do you do if you do nothing?

The Act does not say, well, and if you do nothing and then they add something else on, what happens in that case?

We looked at what happened if the existing system continued as it was over the period of 25 years. We have put before you our findings with respect to reliability and the reserve margin and that at the end of the day there is a requirement for more.

And the plan looks at that requirement for more.

Mr. Grenville-Wood's question with respect to the requirement for more should fall within the context of the application and the problem that we have sought to address in the environmental assessment, because, after all, that's what the Act says.

We don't come here unless we have a problem. If we don't have that problem, there is no need to be here with this undertaking.

Within the context of the undertaking, I think it is fair for Mr. Grenville-Wood to ask Mr. Snelson and the witnesses clearly with respect to alternative technologies, what role they would play with respect to meeting that future requirement, just as demand management and any of the other technologies have a role to play. I think those are fair questions.

But the hypothesis, in my view, is just perposterous because we wouldn't be here if that were the case. That's what the Act is based upon, a problem that has to be addressed, and in doing so, you have to look at the no alternative because that's ultimately where your problem stems from.

THE CHAIRMAN: The question has developed. It was first given to the witnesses as they had to live with the existing system, and now it seems

to be what consideration, if any, would they give to non-major physical new plants. That's what I take it to be.

MRS. FORMUSA: I understand that, but the implication from Mr. Grenville-Wood's last comment was that Mr. Snelson was nitpicking, and in fairness to the witness, I don't believe that's the case.

THE CHAIRMAN: No, I don't think he was, and I think he can just continue.

I think we have it a little bit clearer now. You want to know what consideration they would give to solar energy or techniques of that course if they had nothing else to look to. Is that really what you are saying?

MR. GRENVILLE-WOOD: As usual, Mr. Chairman, you have put it better than I could have.

MR. SNELSON: If the question is that the only permissible form of generation is solar energy --

MR. GRENVILLE-WOOD: Q. That isn't the question, Mr. Snelson, in all fairness, such as.

MR. SNELSON: A. I'm sorry.

Well, what what else is included in the list?

Q. I will leave that to you, your imagination and your knowledge. You are better

informed than I am, I'm sure.

A. You are posing the hypothetical, so...

THE CHAIRMAN: What other forms of energy might you look to if you had nothing else other than -- no other alternatives, put it that way. If you couldn't go to a conventional fossil plant, new hydraulic or nuclear, what would you be looking at?

MR. SNELSON: Well, the alternatives that would be left would be solar, wind. I am not sure whether cogeneration from non-utility generation is excluded from the hypothesis or not.

THE CHAIRMAN: No, I think it is included.

MR. SNELSON: There are other options such as fuel cells, which may or may not be excluded.

THE CHAIRMAN: I am not sure I know what you mean by "fuel cells".

MR. SNELSON: A fuel cell is an electrochemical device for converting a fuel into electricity that does not require the intermediate creation of heat, and thereby actually has the potential for a higher efficiency than thermal generation which is limited by certain laws of thermodynamics. Higher efficiencies have been achieved

on hydrogen as a fuel. People are working on natural gas as a fuel, and this is one of a number of developing alternative technologies that is under development but not yet commercial.

THE CHAIRMAN: On that basis, I think we will now stop and come back at 2:30.

THE REGISTRAR: The hearing will adjourn until 2:30 p.m.

---Luncheon recess at 12:58 p.m.

---On resuming at 2:35 p.m.

THE REGISTRAR: This hearing is again in session. Please be seated.

MRS. FORMUSA: I have some further transcript undertakings for Panel 2 to file. I have provided Mr. Lucas with eight copies. They are all in response to questions from AMPCO, and they are 142.41 through to 142.47 inclusive. And then 142.49 through to 142.51 inclusive.

Copies will be provided to AMPCO and to any other intervenors and that so request.

THE CHAIRMAN: What was the last number you gave me?

MRS. FORMUSA: 142.49 through to 51.

THE CHAIRMAN: Okay. Thank you.

Mr. Grenville-Wood?

MR. GRENVILLE-WOOD: Thank you, Mr. Chairman.

Q. Mr. Snelson, before we broke we were discussing the existing system and also with respect to what I termed "alternative technologies" and the role they play within that system given that hypothetical we were discussing.

Could you tell me, in that context, how the existing system could be adjusted to reflect making

better use of such technologies as solar technology? Do you have any information on that?

MR. SNELSON: A. To the extent that solar technology is not part of the existing system, then when we're talking about adding solar generation to the existing system, in a technical sense, it's not the existing system anymore.

THE CHAIRMAN: I think the question was, how could it be adjusted, if at all -- how could the existing system be adjusted by the use this technology. Have you anything you can say about that?

MR. SNELSON: Have you a specific solar technology in mind?

MR. GRENVILLE-WOOD: Q. Well, let's take them in sequence. First of all, we've got photovoltaics. I'm aware at least personally of the fact that you do have components of that within the existing system. How could you improve the use of that technology within the existing technology system? First of all, have you done any studies in that area?

MR. SNELSON: A. We have done some solar photovoltaic demonstration projects. They include a remote field monitor at Atikokan, which was to provide the power sourse to a sampling device, a measuring device.

We have used photovoltaic cells at Big Trout Lake, which is a remote community as a supplement to reduce the use of diesel fuel in the diesel system in that community. This is the sort of situation where, at the moment, solar has the best prospect of being economical because the alternative, what it is displacing, is the highest cost. In this case it's diesel fuel that is probably flown into Big Trout Lake, but I'm not entirely sure of that.

There is another remote system which is, I believe, a stand-alone photovoltaic system for providing a basic level of service to that community. I forget the name of that community at the moment, but there is one other remote community.

So, in these situations, the existing system has been using photovoltaic technology in situations where it has the best opportunity, we think, to be economical.

Q. But let me explore this a little further with you. From what I'm hearing you say, it sounds as though the contribution to the existing system is fairly minimal?

A. It's very small at the moment.

Q. Do you have any analysis of the performance of those demonstration projects which would

assist you in reaching a conclusion as to whether it would assist in the existing system, going back to the question I was asking a moment ago.

THE CHAIRMAN: Only one of them is a demonstration project. Is that the one at Atikokan?

MR. SNELSON: I believe you would classify all three of them as demonstration projects.

THE CHAIRMAN: All right.

MR. SNELSON: From those studies, we have reports - and I believe they've been submitted in answer to interrogatories - on the actual performance of those systems. 2.10.28 has got the performance of the Big Trout Lake photovoltaic diesel system, dated December 1988, attached to it.

MR. GRENVILLE-WOOD: Q. Yes?

MR. SNELSON: A. Well, clearly these systems produce electricity which reduces the demand for electricity from other sources.

Q. Well, the question remains though: Have you used that data to examine whether or reach any conclusions as to whether or not an expansion of that particular option is feasible within the context of the existing system?

A. That particular option is one option that could be added to the existing system to produce

part of the electricity that is needed.

Q. And do you have any conclusions as to what component, what efforts you've made in terms of trying to quantify the contribution that could be made?

A. As an option to be added to the system, it's considered in Panel 7.

Q. So, what you're telling me then is that within your purview you have no information to provide me?

A. No, that's not what I'm saying. I'm saying that as part of the existing system -- I have told you what photovoltaic systems are part of the existing system, and there may be another demonstration project or two.

But, we've told you that it's a very small part of the existing system, and that it's one option that is available for expanding the existing system to meet part of the needs for electricity generation in the future.

Q. So, to see if I understand you, you're saying that within the context of the existing system, there is nothing more that can be done apart from what you have, but under Panel 7 we will be looking at -- presumably, other people will be talking to us about what other additions may or may not be made

through the photovoltaic alternative; is that correct?

A. Yes, and I think I'd be remiss if I didn't tell you that it's likely that Panel 7 will be telling you that it's about twice as expensive as other sources of generation that are available to us today.

Q. You've volunteered this information. Do you have any data to back up that statement?

A. These sorts of analyses will be provided in Panel 7. I don't have any data with me today.

Q. All right. In the other technologies, let's take them one-by-one. How about active solar? Do you have any component of that in the existing system?

A. Do you mean solar thermal, by active solar? Because photovoltaic is one form of active solar.

Q. Solar thermal.

A. Solar thermal is another technology that can be used to generate electricity by first using the solar energy to generate heat. And while that has some potential in areas of very high insulation, in desert areas of the southern U.S., for instance, it's considered to be less attractive in Ontario than photovoltaic.

Q. Can you give me a specific application that you've looked at to reach that conclusion?

A. I cannot, no.

Q. On what basis have you made that assertion you've just made?

A. There are analyses that are done within Ontario Hydro of a variety of technologies included in the Demand/Supply Plan, including those that have been rejected from consideration in Demand/Supply Plan. Solar thermal is one of those that has been looked at, and the conclusion is that it's less attractive than photovoltaic and that photovoltaic is relatively expensive.

Q. The question I'm asking you is: What data do you have to back up that assertion? You made a general statement about the existence of some conclusions, but do you have any particular document you're aware of?

A. The documentation on that will be available through Panel 7.

Q. Are you by any chance referring to the Middleton Report?

A. No.

Q. So, there are other things in

addition to the Middleton report?

A. Yes.

Q. Let's go to the third technology, which is passive. What is the position with respect to that?

A. Passive solar design of buildings to reduce the heating demand; is that the application?

Q. That's right. That's certainly one very clear application.

Is there anything part of the existing system? We were applying the same question to the three technologies. This is the third one.

A. That is not a technology that generates electricity, as you are obviously aware. It is technology that could affect the demand for electricity.

THE CHAIRMAN: You say it's not a technology that generates electricity?

MR. SNELSON: No. It's merely a design of building. It's a way of designing buildings that would maximize their heat gain from the sun, such as south-facing windows, high degrees of thermal mass and so on.

To the extent that that could reduce the demand for electricity, it could be part of our demand

management program, but I don't know of any specific program in that area at the moment.

MR. GRENVILLE-WOOD: Q. Do I understand you correctly then, from what you've just said, that the demand savings that are part of the use of passive solar technology, do you consider that as part of the existing system?

MR. SNELSON: A. The existing system is what exists today.

Q. Yes?

A. To the extent that existing buildings have been designed to make use of the passive solar features, then that is part of the existing system and it is accounted for in the measured load today, and that is part of the base that is projected forward for load forecasts in the future.

Q. Okay. So, that I understand you then, any enhancement of the program with respect to any one of these technologies, whether it be active, passive or photovoltaic, any enhancement of the Hydro commitment to those three technologies, if you want to put it that way, you would consider that to be outside of the existing system?

A. Yes. If it doesn't exist today and it's in addition to the existing system, then it is

part of the options that are available to meet the need that we have identified.

Q. I don't think we are understanding each other because you indicated to me that there were, for example, programs in place with respect to passive solar, maybe limited, but they do exist. So, an expansion of those programs would be going beyond the scope of the existing system?

A. I don't believe I said that there were any programs of passive solar.

Q. Sorry, maybe I misunderstood you. I thought you said there were some design programs in place with respect to building design and so on.

A. I said that passive solar, to the extend that it would reduce the demand for electricity, could be part of our demand management program, but that I wasn't aware of any specific initiatives in that area.

Q. I see. Sorry. Then I misunderstood you.

THE CHAIRMAN: And by that you mean Hydro initiatives?

MR. SNELSON: I wasn't aware of any specific Ontario Hydro initiatives.

...

[2:50 p.m.] MR. GRENVILLE-WOOD: Q. With respect to any of the other technologies would an expansion of an existing program be considered part of the existing system or not, in your estimation?

MR. SNELSON: A. This is drawing fine lines, but if it is something that isn't underway today, and it is an enhancement or a new program or enhancement of an existing program, I would generally consider it to be not part of the existing system. But that is a fine line.

Q. Why I'm asking this line of questions is simply because you were drawing the line earlier between, you know, the hypothetical I put to you, which was if you were given a directive not to expand the existing system in terms of major facilities, what could you then do. You indicated a number of things you could do, including some demand management activities and presumably some other alternatives.

But are you saying then that that would not be part of the existing system? You'd have to go beyond the existing system for that?

THE CHAIRMAN: Well, it seems to me it is semantical. I'm not quite sure where this particular line of questioning is leading you. What is it you want? What point is it you want to make?

MR. GRENVILLE-WOOD: I'm just trying to understand from Mr. Snelson, Mr. Chairman, what he considers to be the existing system and whether or not enhancing it -- because as you can see from Exhibit 136, the page 1, there is an analysis, at least this very simple diagram, which identifies the need that has to be met, and there was testimony with respect to how that need can be met on one side by reducing demand, on the other side by increasing supply. What I am trying to work out from Mr. Snelson is what component of these changes consists of adjustments to the existing system that we can talk to Mr. Snelson about.

THE CHAIRMAN: But at the present time the amount of solar energy, having a source in Hydro as being demand is insignificant, is that right?

MR. GRENVILLE-WOOD: Very much right, yes.

THE CHAIRMAN: I mean it is not even part of the measurement.

MR. GRENVILLE-WOOD: Not for the 1990 load forecast, no.

THE CHAIRMAN: So, for all intents and purposes solar energy is not part of the existing system, except in the very limited way of the demonstration projects that he's mentioned.

MR. GRENVILLE-WOOD: There is some activity, is my understanding, correct me if I'm wrong, Mr. Snelson, with respect to active solar. There are no programs, from what Mr. Snelson says, in passive solar.

The point I'm addressing is whether or not enhancement of those programs, whether they be alternative generation or demand management, as Hydro likes to call it, would be considered within changes to the existing system or enhancement of the existing system, or whether they are, in fact, going beyond.

THE CHAIRMAN: Perhaps you could answer that question.

MR. SNELSON: Basically, any solar technologies that would change the demand for electricity would be considered to be part of the demand management program, which will be discussed by Panel 4; any solar technologies that generate electricity would be considered one option for the supply of electricity, which will be dealt with as appropriate in the supply panels, and I believe, in this case, it will be Panel 7.

MR. GRENVILLE-WOOD: Q. I know that, but I'm afraid you haven't answered the question. I'm not going to waste any more time on it. It is perhaps

unnecessary.

THE CHAIRMAN: I think he's answered the question as I understand the question to be.

MR. GRENVILLE-WOOD: Q. Within the context of the existing system again, Mr. Snelson, when you have looked at technologies, do you look at any impact of technological change on the existing system? You take an example of your own choosing and tell me how you address the issue of technological change within the existing system.

MR. SNELSON: A. Technological change can affect the usefulness of the facilities that we already have.

Q. Yes.

A. There has been discussion about the effect of increasing environmental controls, and at the same time -- or increasing need for environmental controls, and there are also technological developments under way to provide the control facilities that will be needed to meet environmental controls.

So, there is one example of technological change as it effects the existing system.

Q. How do you address the question of issues of this nature that are essentially unforeseen, in the sense that -- we were talking to the load

forecast people in Panel 1, and I think Mr. Shepherd referred to that this morning in terms of looking at the technology in the environmental field, and regulation in the environmental field, being essentially evolutionary. In that there are no major breaks in the trend.

In your work, in terms of managing the existing system, do you allow for any major breakthroughs in technology? How do you address the question of breakthroughs in technology? Or do you just make the assumption that things are going to go on essentially as they are?

A. I think we talked this morning about in plans in general - and this relates not only to the existing system but to the future system, that in plans in general - we have to make prudent allowance for anticipated changes in technology or in regulation, and that because there are the possibilities of change that are greater than, or different to, those that are anticipated, then there is a need to maintain some sort of flexibility in planning to accommodate change as it occurs or as it becomes more clear that it will occur.

Q. Apply that argument to the technologies that I'm interested in. You have indicated that essentially they are, in Mr. Chairman's

words, insignificant in the existing system.

Is there any allowance or flexibility in analyzing their contribution, from the perspective of rapid or maybe major technological change?

A. On the one hand there is the problem of predicting at what point these technologies will become economical, and that may be influenced by environmental concerns as well. And that is part of the difficulty of prediction.

In terms of maintaining flexibility, then there are possibilities of incorporating solar technologies into plans, if and when the technologies become economically and environmentally desirable.

Q. You have made two references in your answer to environmental matters. I'd just like to explore that with you for a moment.

When you make an analysis of the economic cost of the technology, to what extent do you take into account the environmental cost of either that technology or another alternative to it?

A. Environmental effects are taken into account in our decision making in a judgmental way in most cases. The costs of meeting environmental regulations or the changes of the costs of meeting environmental regulations are factored into economic

analysis.

So, for instance, solar technology would either reduce the need for acid gas control, or they would reduce acid gas emissions, one or the other, presuming that no other changes were made to the system. And economic analysis, as we will discuss in Panel 3, does include allowances for that change in cost.

Q. When you say to me that you make this comparison, let me see if I understand what, in fact, you're doing. When you tell me that a photovoltaic, in these demonstration projects that you have referred to, is only economical in certain situations, in what way are you analyzing the environmental cost of providing the power in other ways other than solar?

That's not a very good way of putting the question. Let me put it another way.

When you make a comparison of costs, when you're making this economic analysis you were referring to earlier, and you found that solar technology is only applicable in certain situations, I am talking about photovoltaic, specifically, you said it was only economical in certain situations. On the cost side of the non-solar generation of power, have you taken into account the environmental cost of that generation, and

how?

A. In an economic analysis of photovoltaics versus coal fired generation on the main system, then the costs of coal fired generation would include all the costs to reduce the incremental acid gas emissions from the coal option to zero. That is one way of giving the advantage to the solar alternative of having zero acid gas costs, zero acid gas emissions.

Q. Now, you are calculating that as a cost to Hydro?

A. I'm calculating that as a cost to the coal fired alternative, which would be compared against the solar alternative.

Q. Do you take into account any external cost?

A. Generally, we do not include dollar estimates of external effects. External effects are taken into account as separate factors in decision making.

Q. Can you tell me how?

A. In the decision making on what options to pursue, what options are satisfactory, and on plans. And this is, I think getting to the nub, the judgment of what makes an acceptable plan and how the

external factors are taken into account is really the panel 10 or 11 discussion that is towards the end of this presentation of evidence.

Q. Do you accept, at least as a basis, that essentially solar technologies are environmentally benign? Is that a fair characterization from your perspective?

A. There are relatively few environmental effects in the operation of solar technologies. There may be some environmental effects in their manufacture.

Q. With respect to the remote system, which we were alluding to a moment ago with respect to photovoltaics, we talked a little bit about a couple of demonstration projects. To what extent would an expansion of the remote system of Hydro, assuming that that is seen still as a part of the existing system, I don't want to get into that semantical debate, but to what extent would expanding that remote system of Hydro's, contribute to extending the life of the existing system? Do you have any analysis or studies of that area?

A. Well, I think we have had the discussion before that the remote system is not connected to the main system, which the application and

which the alternatives that we are looking at are intended for. So, essentially more photovoltaic cells in remote systems will have no affect on the major interconnective system of the one of the largest part of Ontario.

Q. Is it not true that part of your planning would entail extending the existing system into those remote areas, which are susceptible of remote generation?

A. From time to time there are studies done of extending the major interconnective system to incorporate a remote community. I believe that the numbers on the total load in the remote communities are so low that the extension to include a few of those remote communities in the main system would have almost negligible affect on the main system.

...

[3:05 a.m.] Q. And conversely, the decision not to extend the main system to those communities but to have them generate through whatever technology they may choose, but to have them generate for themselves would also have a negligible impact?

A. Yes.

Q. Do you know what decision-making process is in place to decide whether a community should be linked to the main system or not? Is there a decision-making process in place?

A. There are planning processes for the remote communities and they have their own planning department in Thunder Bay, and, theoretically, it is possible that a proposal to connect to the main system could originate from that source.

Q. Could you just identify what that source is again? I am not sure I understood you.

A. The planning group that plans for the remote system which is situated in Thunder Bay, it is Ontario Hydro but is in Thunder Bay.

Q. Yes?

A. The most likely circumstance whereby a remote community gets connected, and the reason that that first process is a little unlikely is that those communities are generally a long way from the existing

system and that significantly affects the economies of connecting them and that is why they are remote.

The most likely circumstance whereby a remote community gets connected is that there is some Hydro project which is, for other reasons, extending the main system, so that the distance between the remote community and the main system is being reduced significantly, and at that time, specific planning studies may be done to see whether or not to connect the remote community to the main system.

Q. At the time such studies are made, is there a comparison made? Is it part of the terms of reference of that study to look at a comparison of local generation in that remote community?

A. I would expect that the comparison would be made between the community continuing to be a remote community and having sufficient local generation provided to it, versus it being connected to the main system and becoming essentially part of the main system.

Q. So, you would expect, but you don't have any specific information of a particular instance?

A. There is one that I know of that is under consideration, and that is the connection of Armstrong which is close to Little Jackfish, and that's

part of the considerations going into the Little Jackfish Environmental Assessment, and one of the issues associated that development is whether or not Armstrong should be connected to the main system.

Q. Would you be aware of whether the solar alternative is being examined within the context of that particular instance?

A. I don't know.

Q. Could you find out and let us know?

A. Yes.

MR. GRENVILLE-WOOD: Should we number that undertaking?

THE CHAIRMAN: 142.61.

I take it it never goes the other way, you never take something off the main system and put it into the remote system?

MR. SNELSON: I have never known of that happening.

MR. GRENVILLE-WOOD: It may be nice to remove some of those transmission lines.

MR. SNELSON: It happens occasionally by accident.

MRS. FORMUSA: Could I just, because I am somewhat familiar with Little Jackfish, just make it absolutely clear what the undertaking is with respect

to. Is it whether the solar was considered as an alternative to what?

Because one the alternatives in the Little Jackfish is to connect Armstrong to the main grid as part of the development of Little Jackfish, and I am not quite sure how Mr. Grenville-Wood...

MR. GRENVILLE-WOOD: My understanding was that there is a debate as to whether or not Armstrong should be connected or not, and in this debate the question I am asking is, has the possibility of meeting Armstrong's demand by way of solar generation been considered or is it being considered, and to what extent.

MRS. FORMUSA: Thank you.

---UNDERTAKING NO. 142.61: Ontario Hydro undertakes to provide whether the possibility of meeting Armstrong's demand by way of solar generation been considered or is it being considered, and to what extent.

MR. GRENVILLE-WOOD: Q. Can I just ask you a question about hybrid systems, Mr. Snelson. What is the potential in your estimation or in your analysis of hybrid systems on the existing system from both the supply perspective and from the perspective of their environmental affects?

MR. SNELSON: A. First of all, can you tell me what sort of hybrid? Hybrid is any combination

of two systems and presumably you have in mind some specific systems connected together as a hybrid.

Q. For example, you would have a diesel/solar combination for one, you could have a diesel/wind combination for another. You could have many, many others.

A. Hybrids of the nature you have described are the sort of hybrid systems that we use in remote communities. And as you know, we have a diesel/wind system at Fort Severn, and we have a diesel/photovoltaic system at Big Trout Lake. These systems are competitive or have a chance of being competitive in remote communities with electricity costs that are considerably higher than connected to the main system.

I would expect that photovoltaics connected to the main system would be at least as economical as a hybrid diesel/photovoltaic connected to the main system, or less uneconomic, put it that way.

Q. And have you done any analysis with respect to those kinds of systems and their environmental impact?

A. The studies that we do of photovoltaic and wind systems includes their environmental impacts.

I do not recall any specific studies of hybrid systems as you describe for connection to the main system.

Q. All right. Turning to Mr. Taborek now. Thank you, Mr. Snelson.

Mr. Taborek, in your direct testimony you were dealing with the concept of public appeals. I think it is on page 2842, line 4, and subsequently. You said:

> "Finally the question of public...to ask them to cut, and these cuts imputed to be at little or no cost."

Then you said:

> "...in the early 80s we had thought something like 10 per cent might be available, now we believe we are looking at something more like 2 per cent."

Could you tell me why you have reduced that prediction, if that's the word to use, from 10 per cent to 2?

MR. TABOREK: A. On the basis of looking at the reaction we got to some recent public appeals we made.

Q. Can you tell me a little bit more about that, please?

A. There were public appeals made in the late 1980s. The procedure is to look at the load that resulted after the public appeals and attempt to reconcile that with the load we expected in that same time period. So, that is the comparison that was made.

The differences were small. We judged them to be of the order of one, and we felt that a 2 per cent number was a reasonable number to use for further planning purposes.

Q. Could you tell me what the nature of the public appeals were that you are using to make the change? What sort of public appeals did you put forward in those instances?

A. They come under the general heading of appeals to the public and limited industrial appeals.

Q. What sorts of things would you ask the public to do and industries to do?

A. Mr. Barrie will pick up.

Q. I would happy to have Mr. Barrie answer.

MR. BARRIE: A. We will split it into two, there is a public appeal and there is a limited industrial appeal. I will deal with the second one first because it's shorter.

A limited industrial appeal is when we, Ontario Hydro, appeal directly to our large direct customers and to the large customers of the municipal utilities. By large I mean anyone with more than 5 megawatts of load. We ask them to reduce load without affecting their production. That's why it's called a limited industrial appeal.

The other aspect, the public appeal --

Q. Just before you move on to that, just to finish the thought. You are distinguishing this limited industrial appeal from those people who get the reduced rate because they have this interruptible agreement?

A. Yes.

Q. That's different?

A. They are totally different concepts.

Q. All right. Okay. I just wanted to make that clear.

A. The other aspect of the appeal is the public appeal where we put out a general appeal to the public via the media and ask them to reduce their demand. We ask it specifically. We try and identify a specific time when we envisage having problems. If it's the whole province, then it will be the whole province or it may be a specific area if we have a

problem in a given area. But the example quoted in 1989 was for the whole province.

Q. Can you tell us what sort of appeal did you issue at that time?

A. Just a general appeal to the public via the media to reduce demand.

Q. Just like that?

A. Would they go around and switch off lights in rooms that weren't being used, that kind of thing.

Q. And it was through what, television advertising, radio advertising, newspapers?

A. Yes. The media, any media form, yes.

Q. What would motivate, what sort of situation motivated this public appeal in 1989?

A. There were two cases. It's in any situation when we envisage having problems meeting the envisaged demand. It can either be a capacity shortfall where we do not simply have enough generating units to meet the instantaneous demand, or it could be an energy shortfall where over a period of hours we don't think we can meet a demand. There are two distinct reasons.

The particular one in 1989 fell into that latter category of an energy shortfall.

Q. These appeals, then, are they not part of any integrated program of reducing demand. They are just one shot deals; is that a fair way of categorizing them?

A. They are part of a package that we have in operations at our disposal to reduce demand if we cannot meet the demand.

There are a number of other things we can do, you already mentioned one, the interruptible loads. There are a number of others at our disposal as well.

Q. What I can't come to grips with in my own mind is why this special appeal. First of all, you have limited its scope to 2 per cent impact; secondly, it seems to be unrelated to general programs of demand reduction.

A. Yes, it's a totally different concept. We are trying to get through a particularly difficult period on a minute-to-minute basis. The kind of general program you are talking about, about demand reduction, is more an energy management strategy that Ontario Hydro would embark upon to reduce demand over the long haul.

THE CHAIRMAN: The earlier evidence has been that what we are talking about now is an operational technique whereas demand management is a

planning technique, and they are quite distinct.

MR. GRENVILLE-WOOD: I understand that. The question in my mind is why they aren't in any way related as part of the whole operational system. If you have got a longer term demand --

THE CHAIRMAN: There may be in Panel 4 evidence about public communication, if you will, in the context of demand management, but that's not what they are talking about when they are talking about public appeals. It's operational technique to deal with a specific situation.

MR. GRENVILLE-WOOD: Yes, Mr. Chairman, I understand that. I am just trying to relate them to something else.

Q. I am also trying to understand, Mr. Barrie, why -- let me take a step back.

You indicated that the 1988 and '89 incidents caused you to revise the impact from 10 per cent to 2 per cent. It was based upon your experience in those particular situations; correct?

MR. TABOREK: A. Yes.

Q. Did you at the same time analyze the method of implementation of the public appeal in order to see whether there were any problems with it in terms of trying to keep your 10 per cent impact at the same

level? What sort of study did you do of the impact?

It seems very easy just to sit back and say, well, we only had a 2 per cent response, therefore we should lower our expectation.

A. No, we did not do further studies to see if we could get 10 per cent. We judged that 10 per cent at no cost to the public, a 10 per cent reduction at no cost to the public was not a likely number in the present day and age.

Q. It's at no cost to Hydro presumably, you mean.

...

[3:25 p.m.] A. No. It's at cost to the public. The public appeal category is assumed to have no cost to the public. If it has a cost to the public, it falls within, really, that we would call a rotating load cut.

Well, a load cut. Pardon me. That's not the correct analogy. We tend, for the work we do, to think in terms of unsupplied energy, which has a cost to the customer and unsupplied energy that doesn't.

The unsupplied energy that has a cost to the customer is what we're interested in determining so that we can calculate the minimum total customer cost. And the various emergency measures that have no cost to the customer, we will use some of those in setting our reliability target in terms of system-minutes.

Q. The question that flows from what you've just told me is: You've looked at it from a perspective. I'm just wondering whether you've looked at it from the other perspective of the effectiveness of the appeal in the context of whether it's convincing the public to take certain measures or not. In other words, what is participation rate, if you want to call it that.

If you're only getting a very minimal response - you indicated 1 per cent - and you've then just sort of said, "Well, I guess we can't expect very

much out of this," I'm just wondering whether you've made a more indepth analysis of what is the content of your appeal and how it is put forward and why it's getting a negative response from the public?

A. I don't think the response is negative. I think the response is limited, and it's limited by their judgment of what they are willing to give up under those circumstances.

Q. All right. Well, if you look at it that way -- I mean have you looked at it from the point of view, well, we're not asking the right question, we're not asking people to do the right thing, they're not understanding what we're asking? Have you asked those questions?

MR. BARRIE: A. Not to my knowledge. The techniques we use for this voluntary curtailment, as we call it, were drawn up in -- well the present ones were drawn up in 198 7 and, to the best of my knowledge, they have not been reviewed since that time.

Q. But you have revised your expectations?

A. I beg your pardon? Sorry.

Q. Were you going to say something, Mr. Taborek? You haven't revised your expectations though?

MR. TABOREK: A. No.

Q. You haven't reviewed the 1987 methodology, if you want to call it that?

A. Right.

Q. But you have revised your expectations?

MR. BARRIE: A. Yes, because there were no voluntarily curtailment request put out. From 1980 there was only one in 1985, one in '87, one in '88, and there were three in '89. So, we really didn't have much evidence of what to count on until '88-'89 really demonstrated to us that 1 or 2 per cent was about right. 10 per cent, there's never been any evidence that we get anything like 10 per cent.

Q. But this 1 per cent figure or 2 per cent figure has a pretty large impact on your reserve margin, does it not?

MR. TABOREK: A. Yes, it does.

Q. So your reserve margin would adjust downwards, presumably, if you could predict a greater response in these emergency situations?

A. Yes.

Q. Can I just now move again to Mr. Taborek, pages 282 and 283 of your direct testimony where you were talking about reliability and you were talking about small generation being more reliable than

large generation.

- THE CHAIRMAN: I don't think that number can be right.

MR. GRENVILLE-WOOD: Sorry?

THE CHAIRMAN: His direct testimony wouldn't be on page 283.

MR. GRENVILLE-WOOD: Sorry. 2823. Sorry. I skipped a number. 2822 and 2823.

Q. I think you indicated that, at least conceptually, that small generation tends to be more reliability than large generation. If that's the case, can we not, therefore, obtain greater reliability within the system from increasing the number of small generation sources.

MR. TABOREK: A. Yes.

Q. And, following that argument through, that if we put more reliance on the small generation system, then we would not need as great a reserve margin?

A. Yes.

MR. SNELSON: A. That is all other things being equal. So, if the small generation has the same forced outage rate as the big generation --

Q. Has the same...?

A. Same forced outage rate as the big

generation and the same probability as being available at the time of peak load.

Q. We put the preliminary to Mr. Taborek, and he indicated that small generation tends on average, I suppose, to be more reliable than large generation. Are you thing changing the testimony?

THE CHAIRMAN: No. No. He's just saying subject to certain factors and he's been giving you the factors.

MR. TABOREK: Yes. I answered you in the context of small as preferred to large, other things being equal. When one is given one parameter, other things are equal.

MR. GRENVILLE-WOOD: Okay.

MS. PATTERSON: Wouldn't there be fewer forced outages if, in fact, small facilities are more reliable?

MR. SNELSON: There's two factors. One is that for the same forced outage rate, because of the factors that IPPSO was cross-examining about, the system tends to be more reliable with a large number of small units, rather than a smaller number of large units.

There is also a situation that there's a tendency, given a technology, for small units to be

more reliabile than larger units because they tend to be a little less complex, there are things to go wrong. These effects are accounted for in our reliability model.

So, the question of whether the option itself is more reliable, and then there's the question of whether the system more reliable, even if the options are equally reliability, and small options, if anything, tend to be better on both counts.

MR. GRENVILLE-WOOD: Q. Okay. Now, presumably part of this whole - I'm not sure who I'm addressing to now - Mr. Taborek, I think, but Mr. Snelson, as usual, will feel free to add or subtract. With respect to the greater number of small generating sources, would it not be fair to say that the more small generations sources you have the fewer transmission lines you would need?

MR. TABOREK: A. No. I think that's a separate question as to the geographic dispersion of the small sources. They could either be disbursed or they could be concentrated. That's a separate decision.

Q. Okay. Well, take me through that. What do you mean by concentrated? How would you concentrate them?

A. Put them all on one site, or more on one site rather than less.

Q. Well, you know what I'm trying to get at. I mean, if you have fewer small generating facilities, presumably you would then be serving a community or several communities more directly from these, rather than having them plug directly into a main grid. Is that not correct?

A. I don't think I want to start testifying about the design of an alternative to the existing system. I don't think I am an expert on that.

Q. I'm not sure I was asking you to testify about the design of an alternative system. We're just discussing whether or not in general terms, first, if you have fewer large generating facilities meeting the demand of the load in the province, by definition you require a great many transmission lines to deliver them.

If, on the other hand, we took Mr. Snelson's argument and said, well on both counts small generating sources are more reliability and less likely to break down, we start building more small generating facilities. Would that not mean almost, by definition, that you'd need fewer transmission lines? Am I off base on that?

A. Well, if you take as an example our remote communities, those are small communities, first of all that are served with small generation, and they have no transmission linking one with the other. So that that's one alternative which is along the line that your question seems to be going.

However, that is not necessarily a very desirable circumstance, and I think one would look for every opportunity to begin to link those communities because those kinds of communities will have very high reserve margins, perhaps 75 per cent or something of that nature. You can make an enormous saving in reserve margin by constructing a transmission line between two or more communities. Now, the reason is isn't done it the remote areas is because of the long distances that are involved.

What you have postulated is building those in higher density areas, there would be a lot of them the distances would be smaller, and I think one would construct transmission lines between them.

So that's why, having reached that point, I said that I don't think I would like to give an off-cuff answer to a redesign system. I don't think I can do that.

Q. Okay. Can I move now to the

environment division. Thank you, Mr. Taborek.

Could you tell me a little bit about the sort of advice the division, your environment division, gives to planners and managers at Hydro regarding public perceptions of the existing system?

For example, is Hydro taking into account potential or actual public resistance to large hydraulic or fossil fuel or even nuclear generation facilities? To what extent do you look at the public perception and advise management and planners?

MS. RYAN: A. The role and responsibilities of the environment division were provided in an interrogatory 2.14.38, and they specifically do not include the responsibility to advise on public perception. That, in fact, is a responsibility of our corporate relations branch.

Q. So, is it then fair to say that you in your analysis as a division take no account of the public feelings about or perceived public views about issues?

A. Which specific analysis are you talking about?

Q. Well, let me give you an example. We're now going through a demand-supply process, which is scheduled to take a couple of years. Following on

that, presumably there are going to be some site-specific hearings with respect to some of the projects.

Now, if the planning of Hydro is such that they make plans with respect to having an approval take place on such-and-such a date and their planning taking that into account, would they not come to you or would you not go to them and say: "Well, you know, this process is likely to be subjected to increasingly more intense public scrutiny because of the environmental division becoming aware of this because the work we do, people are more and more concerned with intrusive projects in their community. Therefore it might take longer and be more difficult." You don't do any of that?

A. Ontario Hydro does. The specific socio-economic implications of our plans and projects and the community impacts of our plans and projects are, in fact, taken into account by Ontario Hydro as a whole, and Corporate Relations Branch specifically. If you're talking to me as a representative of environment division, then we are certainly and participate, but it is not we who have the lead role.

Q. I understand from what you said you don't have the lead role in this, but do you monitor,

from the point of view of Hydro, the sensitivity of the public, at least the environmental sensitivity of the public to your activities? That's not part of your role; is that what I'm understanding you to say?

...

[3:38 p.m.] A. In any project that we are involved, we would certainly be aware of what is happening in that area, but we don't have any responsibility, that is correct. But that is not to say that it doesn't get done.

Q. I am sorry?

A. There are others who have that responsibility and carry it out within the organization.

Q. So, is the role of environment division limited then to examining the impact of existing activities and taking steps to meet legal requirements?

A. The role of the environment division is to provide a focus on the environment and to encourage those bodies within Ontario Hydro, and line managers who have environmental responsibility, to proceed in that direction. I don't really understand what you're asking me if we do.

Q. Well, I'm trying to see if, as part of your -- well, I guess, is it advocacy role within Hydro?

A. That would be part of it.

Q. Right, so playing an advocacy role, presumably you'd get your input from public perceptions

and public input and public concerns.

A. To play an advocacy role, we do not have to do it all ourselves. We rely on others within the organization, and there are a lot of others within the organization who have expertise in specific environmental areas, and studying the socio-economic and community impacts is one of those specialty areas where we rely on other people, and I believe summaries of the types of socio-economic analyses that we carry out are summarized in the 1989 State of the Environment Report.

Q. The role you play, from what I can understand you are saying now, is that you do play an advocacy role within the department, but you draw upon the expertise of others within Hydro to put together criteria and standards of that kind, and then what do you do with them?

A. With respect to what sort of situation?

Q. Well, let's talk about the particular situation you are facing right now with respect to the DSP. Have you done an analysis of the environmental impacts of the DSP? I presume you have.

A. The environmental analysis was filed as an exhibit with these hearings, and certainly

environment division had a role to play in that, but it was not something that we alone did.

Q. All right, then were you playing the lead role in doing that?

A. We certainly played a very active role. However, there is other strong expertise in the environmental assessment area within the corporation, specifically in the design and development generation. They played a large role as well.

Q. I guess what I'm trying to find out is when you say you play an advocacy role, what do you see as your mandate? Maybe that is a simpler question to put to you. What is the mandate? What sorts of things do you advocate?

A. Again, that information has been provided in response to an interrogatory. Generally, what we are trying to do is advocate that Ontario Hydro do more in the area of environmental protection and improved environmental performance. And again, it is specifically Interrogatory 2.14.38.

Q. All right. From that perspective, do you have a role in looking at particular technologies, if you want to call them alternative technologies, and assess their environmental impact, and pass that information on to, let's say, the planning department?

A. That sort of technical assessment would be done by the alternatives group in our design development generation division.

Q. That has nothing to do with the environment division then?

A. I think what it is important to remember is that environmental management is a distributed responsibility in Ontario Hydro. That is the only way that it will work. If each manager recognizes that environmental protection is an important part of his or her responsibilities, we have specific line organizations that have been established as technical support groups with environmental expertise in each of the major business areas that we have.

Environment division is a very small division, six or seven people essentially, to try and bring a focus and make sure things do not fall between the cracks and that the environment is, in fact, being considered. But the specific analyses that you are talking about would be done by the line group that has responsibility for new generation.

Q. So, you don't see your role then as in any way attempting to encourage Hydro as a corporate entity to embark upon less environmentally intrusive

activities?

A. That is part of our role, and we are carrying that role out.

Q. Could you tell me how then, in terms of specifics? How would you go about advocating less environmentally intrusive activities to Hydro management?

A. We participated in commenting on the Demand/Supply Plan preparation and the environmental analyses, and so our comments are, in fact, reflected in those documents. We participate in other working groups and are aware of other technologies that are being looked at, and certainly within planning branch, we have a whole research division that do developmental work on new technologies and emerging technologies, and we encourage those people in generation, looking at alternative technologies, to do so.

Q. Have you done anything with respect to solar technology in that context?

A. My understanding is that our design and development generation people are, in fact, assessing a whole range of alternative technologies, and I am not specifically aware of the state of that document--

Q. I'm asking...

A. --or the extent to which--

Q. Sorry, go ahead and finish.

A. --or the extent to which solar has been reviewed.

Q. Within your department, within your division, you haven't got any information from anywhere which you could then use as a basis for advocating solar technology within the whole of Hydro?

A. Could you please repeat that?

Q. On the basis of what you answered a moment ago, can I take it then that you don't have any information or analysis with respect to solar that you could use in the context of advocating it within the whole of Hydro?

A. No, I can't agree with that, because one of the strengths that we have is the ability to contact the technical experts within the organization, when we need that information, and so, while I may not be able to give it to you right now, we have the people that I would draw on to get that information.

Q. Well, have you got any information that you have been using to advocate the use of solar within Hydro?

A. Other than the projects that Mr. Snelson has already referred to, I don't have any

additional information to add.

MR. SNELSON: A. But there will be additional information.

Q. Sorry?

A. There will be additional information brought, probably, by Panel 7. That is where the discussion of technical, economic and environmental aspects of alternative energies will be brought.

Q. That may very well be, Mr. Snelson, but...

THE CHAIRMAN: I think this is a good place to stop for a break.

THE REGISTRAR: Hearing will recess for 15 minutes.

---Recess at 3:48 p.m.

---On resuming at 4:09 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Please be seated.

MR. GRENVILLE-WOOD: Mr. Chairman.

Q. A couple of questions still to you, Ms. Ryan. Is it fair to say that, in fact, your department is not doing any work at assessing the environmental costs, both internal and external, of existing technologies? Is that a correct statement?

MS. RYAN: A. No, I don't think it is

fair to say.

Q. Then what aspect of the statement is not fair?

A. I think there are a lot of areas within Hydro doing work, and to the extent that we encourage it or are knowledgeable about it, that, in fact, is a participation.

Q. The question was a bit more specific than that. That your department per se does or does not do any work at establishing the environmental cost of existing technologies, both internal and external.

A. And by environmental cost, do you mean -- could you please define your meaning of cost?

Q. There are two kinds of cost. One is the cost in terms, when you talk about environment, the external costs which mean impact on the environment per se, and when you talk about it internally, it is the cost of meeting what you would establish as your own, you say you advocate, going beyond even the existing regulations. The cost of doing that.

A. Okay, in fact, I think what you are calling an internal cost, we call environmental spending. So, it is what Ontario Hydro spends on meeting its environmental requirements, and, in fact, we have compiled that information, and it was presented

in last year's State of the Environment Report.

Q. What about the environmental cost external of existing technologies? Do you assess that? It was the impact on the environment of existing technologies, what your actual activities are today. Do you assess the environmental cost of those?

A. The assessments of emissions from various technologies would, in fact, be carried out by the specialty groups with the knowledge in those technologies.

Q. Do I take that answer to mean, you don't do it?

A. We physically do not do the work. We would be aware of the results of studies.

Q. Do you have studies on the external costs of any of the major generating facilities that you have? Do you have those studies available?

A. If you are talking cost as a dollar, no. If you are talking cost as an emission or a potential impact, I believe the environmental analysis, which is an exhibit for these hearings, does give the quantities of emissions or resource use or effluents from each of the technologies.

Q. Do you have, generated by your department, or access to the background information

that generated that report?

A. There was an interrogatory answered on that, and I can't find the number right now, but it did, in fact, provide the background assumptions that were used in preparation of the environmental analysis report.

...

[4:15 p.m.] Q. And does it address the external costs of these various technologies?

A. It addresses the amounts of emissions and the resource use and the amounts of effluents from these various technologies.

Q. So, it doesn't do a cost analysis; it merely quantifies the emissions, for example, of fossil fuel?

A. That's correct, it quantifies emissions and resource use.

THE CHAIRMAN: It doesn't do an analysis in dollars terms.

MS. RYAN: That's correct.

MR. GRENVILLE-WOOD: Q. Is your department undertaking any studies in this area? In other words, are you trying to quantify as the environment division, in dollar terms, the environmental impact of current activities of Hydro?

THE CHAIRMAN: And we are talking now about what is referred to as external costs as opposed to internal costs?

MR. GRENVILLE-WOOD: Yes, external.

MS. RYAN: The environment division at this time is not compiling external costs to the environment for those technologies in dollar terms, no.

MR. GRENVILLE-WOOD: Q. So, you would be in no position, really, to compare technologies with respect to their environmental cost or the external environmental costs?

MS. RYAN: A. There are a number of ways of comparing technologies, and the one that we had chosen was quantifying emissions and resource use.

Q. All right. And as I'm trying to say, you are not in a position then, to compare technologies on an impact basis with respect to cost, but you say, if I hear what you are saying now, that you have got an analysis of impact with respect to emissions and resource use? Anything else?

A. It's covered in the environmental analysis, which looked at resource use, emissions to air, emissions to water, socio-economic impact and, I believe, community impact.

Q. Go ahead. I will let you find what you are looking for.

A. The resource use that was used looked at fuel, land use and water use. The emissions, effluents and waste looked at air, water, waste. The socio-economic environment looked at employment, regional development, local community impact, special or sensitive interest, lifestyle, distribution of risks

and benefits and social acceptance.

Q. You say "looked at." What do you mean by that exactly?

A. They were the criteria used to evaluate the various options.

Q. Okay. And you did that within your division?

A. No. As I pointed out, we participated as part of a larger team which drew on the technical expertise required to do it.

Q. The thrust of my question is very simple, I think, and that is: Are you doing any analysis within your division with respect to those areas of impact to try and quantify the impact in terms of dollars. And the answer is no, I understand, on all those headings?

A. That's correct.

Q. Okay. Last question, Mr. Snelson, to you. It arises out of earlier exchanges, and it is simply this: Is my understanding correct, that when you look at the existing system your characterization of it would be that if there would be a choice made by this Board, that the choice would be - I think Mrs. Formusa referred to it earlier as - a no alternative.

In other words, that the choices are

either you have the existing system with all its warts - depending on your perspective, maybe it doesn't have warts - or something that you are proposing in the DSP. Is that a fair way of putting it? In other words, do you see it in terms of a no alternative, no changes to the existing system, or the DSP?

MR. SNELSON: A. I don't think I am expert in interpreting the requirements of the Environmental Assessment Act. But if a no alternative means no changes to the existing system, then it would essentially mean no demand management, no NUGs, no new supply.

I think the options and the alternatives that are available include a wide range of combinations of those various types, and we are seeking approval of one specific set.

MR. GRENVILLE-WOOD: Thank you.

Those are my questions, Mr. Chairman. Thank you very much.

THE CHAIRMAN: Thank you, Mr. Grenville-Wood.

DR. CONNELL: Mr. Snelson, some time ago during Mr. Grenville-Wood's questioning you made an observation that solar energy, presumably of the photovoltaic character, had relatively little

environmental effect except - and then you qualified it - except possibly with respect to manufacturing.

I presume you were thinking in terms of relatively small scale, but would you still hold that view if one was thinking in terms of, let us say, a thousand megawatts of solar generation? Do you think solar generation on that scale could be accommodated with minimal environmental impact?

MR. SNELSON: If it's one thousand megawatts of solar generation in one location, it would cover an enormous area of land that would have environmental and social impacts.

I think that the most likely form of use of solar photovoltaics, apart from the remote communities, is distributed, and I am sure Mr. Grenville-Wood will probably agree with me here, is that it may very well be distributed such as on rooftops or other such locations, in which case it might have relatively small environmental impact, though if I have photovoltaic cells on my roof, I am not sure I would be very pleased if my neighbour grew a tree.

DR. CONNELL: Thank you.

THE CHAIRMAN: Any further questions, Mr. Grenville-Wood?

MR. GRENVILLE-WOOD: No.

THE CHAIRMAN: Thank you.

Ontario Natural Gas?

Dofasco?

MR. BADER: Good afternoon. I should introduce myself. My name is Michael Bader, B-A-D-E-R, and I appear on behalf of Dofasco.

Now, I have a number of questions, and the first question I will be directing to is to Mr. Taborek. And I will be referring to Volume 16, transcript of the proceedings on Tuesday, May 21. I will wait until a copy this transcript is provided to you. I don't know if the Board has copies of the transcript.

THE CHAIRMAN: Are you going to refer to lengthy extracts?

MR. BADER: I believe I will. I will be taking the witness to a particular page and line references.

THE CHAIRMAN: But you will be reading the quotes?

MR. BADER: Yes, I will read them.

THE CHAIRMAN: That is fine.

MRS. FORMUSA: We are just getting a copy.

MR. BADER: It may assist the witness to have a copy of the transcripts so, hopefully, my questions will be understandable.

CROSS-EXAMINATION BY MR. BADER:

Q. You have a copy of the transcript in front of you?

MR. TABOREK: A. Volume 16?

Q. Yes, it's Volume 16. And perhaps if I can, I would like to take you specifically to -- the specific reference to page 2728 of that transcript. And, in order to put the passage I will be quoting in proper context, I believe you have to back up to page 2726. This is an extract from a fairly long answer you were giving. Do you see beginning at line 20, Mr. Taborek?

A. Yes.

Q. And let me just read it. The question is:

"And I would like to add a third term, and that's reliability. How do you define it and how does it relate to capacity and energy?"

At this point in time, I understand from reading the transcript you were referring to those two other aspects, capacity and energy, and now you were

directing your mind specifically to the issue of reliability of the source.

A. Yes.

Q. And you will see on page 2727, again at line 4, this is part of your answer where you say:

"By contrast, electricity must be produced when it is demanded. This is a phrase that you often see in describing electricity. And it is actually quite a serious phrase because if the capacity is not there to meet the demand, some very destructive effects can occur."

Do you see that passage there?

A. Yes.

Q. I take it the rest of that page, the destructive effects that you are addressing are simply the destructive effects on the generators of electricity?

A. Yes. On the electricity system, generation and transmission.

Q. That's right. The generation of that electricity for the customer?

A. Yes.

Q. And then we turn over to page 2728, and here beginning at line 2, you say:

"We basically have to provide the electricity when needed, or to cut the load to customers. And what we do in that instance is we generally try to rotate those cuts among different customers so that the inconvenience is shared equitably.

By and large, people are willing to tolerate this kind of thing if it is on a rare occasion and with good reason."

I will just stop there from my quote. I would like to ask you this question: Are there customers whose electricity supply cannot be interrupted?

A. Yes.

Q. And perhaps can we categorize those? Would there be, for example, certain essential services - hospitals - whose electricity supply must be guaranteed, so to speak?

A. Yes.

Q. Now, in addition to essential services, do we have - and again this is my term, and if you are having difficulty with it, we will perhaps find a better time - are there essential industries whose electricity supply cannot be interrupted?

MR. BARRIE: A. Perhaps I could assist.

Q. Certainly. Jump in any time.

A. To the best of my knowledge, we do not give preferential treatment to any given industry. I am talking about firm customers.

Q. Yes.

A. All firm customers are equally firm in that context.

There are a number of special cases, as you pointed out, hospitals, where we strive to give them some added reliability. But I don't know of any others.

Q. By any others, no one other than a hospital would be a customer whose electricity supply cannot be interrupted?

A. Hosptials -- there may be other essential public facilities. I am trying to think of other examples other than hospital because I don't want to be tied to just hospitals, but none are springing to mind right at the moment. I don't know that there are any industries that are specifically exempt from any cuts.

Q. So, the ones that would be would come under the rubric essential public facilities, which would include hospitals?

A. Yes.

Q. Are there any others that you can think of or name for us here?

A. No.

Q. Now, as I introduced myself this afternoon, my client is Dofasco, and I take it that is a company that's known to you?

...

[4:30 p.m.] MR. TABOREK: A. Yes.

Q. And I take it my client would not fall into the category of essential public facilities?

A. Correct.

Q. Now, going back to this passage that I read to you at 2728 about rotating cuts among different customers, would I be correct in concluding that after removing the essential public facilities from customers whose services can be interrupted, you are, in fact, reducing the pool of customers upon whom the burden must fall to have their supply reduced?

MR. BARRIE: A. Yes. But as I pointed out, the exemptions are few and far between. The majority of firm are equally firm.

Q. But it's equally correct that we have to then look at a perhaps narrower pool of customer and given the fact that there are those essential public facilities whose demands cannot be interrupted?

A. Yes, but it is a very small percentage.

Q. I'm going back to this passage at 2728, when the term or the expression is used that the inconvenience is shared equitably - those are the exact words that you used - it's only shared among those who do not fall within an essential public facility?

A. Yes.

Q. Now, perhaps I will address this question specifically and ask Mr. Taborek, specifically to you, since it's your testimony here, you used word -- and again it's at line 6 on page 2728, you used the term "inconvenience" when referring to the effect upon customers whose electricity needs must be cut back; is that correct?

A. Yes.

Q. Now, one definition of inconvenience is annoyance. Would you accept that from me?

A. Yes.

Q. I believe it's the Webster's dictionary definition.

Are you suggesting then that a temporary outage is just an annoyance to industries?

A. No.

Q. Is it that you would have used or chosen to use a different word than inconvenience to describe the effects on industries when a cutback is required?

A. No. I think that's a reasonable word.

Q. So, you mean inconvenience, but you don't mean it to mean an annoyance?

A. That's correct. It can have a wide range of meanings.

Q. Perhaps you can tell us what you meant by inconvenience then.

A. Whatever the impact of a one-hour rotating load cut on the person is.

Q. Now, in terms of impact on the generator at page 2727, you used the words "destructive effects can occur."

A. Yes.

Q. Is that a possible impact on a customer as you used the term "inconvenience" on 2728, as you have just expanded? Could it include that?

A. It includes a wide range of possibilities including some very serious ones.

Q. Would I be correct in stating that customers like my client, Dofasco, are dependent upon a continuous and reliable source of electricity?

A. Yes.

Q. And would you agree with me --

A. If I may, those words are not used in the sense of an absolute, but with respect to a criteria.

Q. Yes. Generally speaking, clients, like Dofasco, and perhaps other large industries, look

to Hydro to provide this dependable source of electricity which it has in the past?

A. Yes. And we, in turn, have described the criteria that we use to determine that degree of reliability.

Q. Let me use this analogy when we are dealing with power outages. To a homeowner, the consequences of shutting of an air conditioner may well affect that individual's present environment sufficiently to chase the consumer, if he's like myself, to the closest cinema that has air conditioning. But to someone like my client, Dofasco, the consequences of an outage is not simply flicking the switch and walking away to the cinema.

A. That is correct. We have, of course, surveyed customers and determined the relative impact by customer group of outages of that nature.

Q. You mentioned surveys. Would the survey include clients or individual consumers such as my client, Dofasco?

A. Yes.

Q. And what conclusions have you arrived at as a result of those surveys?

A. The survey results are recorded in two documents, Exhibit No. 140, where some of the early

survey results for various customer classes are reported in figure 2-4, for example, and in Exhibit 87 where the updated numbers we are now using are also reported

Q. And without going through those - I realize the panel has them - is there any kind of conclusion that you have arrived at with respect to --

A. The industrial costs are higher than the residential, as reported to us.

Q. Besides addressing costs -- and I take it you mean financial costs?

A. Yes, financial costs.

Q. Does it also address impacts on issues of safety towards employees?

A. Yes.

Q. And what do you find there from your survey?

THE CHAIRMAN: You are now looking at one of the exhibits; is that right?

MR. TABOREK: No, sir. This is backup information.

THE CHAIRMAN: Oh, all right. Thank you.

MR. TABOREK: And, in the course of doing the surveys, one of the topic areas was hazards of interruptions.

Large users, 34 per cent of respondents stated that serious hazards exist for humans when an emergency interruption exceeds one hour, 16 per cent reported serious hazard to the environment for a similar interruption.

In the case of small industrial users, 22 per cent of respondents stated that hazards would be created. There are no reports on the residential.

On the large farm, 71 per cent of respondents stated that hazards would exist to humans, livestock and crops. Retail trade, 30 per cent of respondents stated that hazards might exist. Offices, 55 per cent of owners and 17 per cent of tenants stated that hazards might exist. And institutions, 45 per cent of the respondents stated that hazards might be created.

MR. BADER: Q. Are the kinds of hazards that are referred to explicated any further, or broken down any further into headings?

MR. TABOREK: A. No. Not in the information I have.

Q. Perhaps I will just jump ahead for a moment, and this may be a question better addressed to Mr. Barrie, is that something that Hydro considered or took into consideration when looking at or creating

their reserve margin?

A. I will respond to that. The direct costs reported by these various classes of people in these surveys was used to set the reserve margin.

Q. And just so that I understand, by direct costs, you include the financial costs, is that one of the components?

A. It is the costs that they believe to incur as a result of the outage, the direct cost of the outage. So that if they, for instance, made some capital investment as a result of it or took some other measure, then that would be included. It was their judgment to describe the cost.

Q. Okay. Just so that I understand when we use this term "costs," are we also addressing the costs that can be associated with increasing potential danger or creating a potential dangerous situation to employees?

A. No, unless they took some action as a result to cover that.

THE CHAIRMAN: I'm sorry. I didn't get that last part.

MR. TABOREK: No. If they took actions as a result --

THE CHAIRMAN: Which cost them money.

MR. TABOREK: Which cost them money, and it was for that purpose, then it would be included.

MR. BADER: Q. Sorry, I just lost my train of thought. I may come back to it.

I take it that companies such as Dofasco need time to adjust their operations to accommodate an outage; is that correct?

MR. TABOREK: A. It will need time. They would certainly prefer time. It would be less inconvenient, onerous, difficult for them.

Q. And it's somewhat of a domino effect, the supply of or an outage may, while it affects particular machinery, can affect entire operations in companies like Dofasco.

A. Yes.

Q. And that's what takes --

A. Perhaps I should be a little more precise. There can be significant effects for corporations. I do not know Dofasco's operations to be able to comment precisely.

Q. That's fair enough.

A. Electricity interruptions are serious.

...

[4:45 p.m.] Q. And perhaps, I don't know if you could help me on this based upon your personal knowledge, but the effect of the electrical interruption of service not only affects the safe operation of equipment, which can include pollution equipment, but also a safe environment for workers?

A. I basically would go back to the responses we got to our survey and use that as an answer.

Q. Other than the survey, is there anything else, any other experience you can draw upon to assist me here?

A. No.

Q. So, if I can again take you back to page 2728 of your testimony, at line 8 to 10, where you say:

"By and large, people are willing to tolerate this kind of thing if it is on a rare occasion with good reason."

Would you agree with me that it will be tolerated, but done so with some difficulty?

A. Yes.

Q. Not only with some difficulty, but for some concern with respect to the operations of a particular industry, including operating in a way which

would enhance the safety to its workers?

A. Yes.

Q. Now, again the next questions deal with this development of the reserve margin, the operating reserve margin. Again, perhaps Mr. Barrie can help here. If you can, please feel free.

MR. BARRIE: A. If it is in the operating reserve margin, yes. The planning reserve margin, Mr. Taborek is more knowledgeable.

Q. I believe I will be addressing it in terms of the operating reserve margin. The figure that has been used is 21 to 24 per cent, if I have it correctly.

MR. TABOREK: A. Would you like to ask -- I think that is probably planning reserve, but if you would go on with it...

Q. Is that planning reserve? Let me just check who was answering the question. I apologize.

Again, it is at page 2824, beginning at page 2824. I don't know who was answering the question at this time, but...

A. I think that is me.

Q. Is it? Thank you. 2824 through to 2825, the question I would ask you, is that I

understood - and correct me if I'm wrong - that the creation of a reserve margin is a minimum for unplanned outages. Do I read that correctly?

A. Excuse me, minimum for unplanned outages?

Q. Yes.

A. I'm not sure...

Q. It is the minimum reserve that you would have for an unplanned outage.

A. Well, if I'm understanding you correctly, I may not, it generally represents a target that we aim for. And then as the years go by and we aim for that target, we would sometimes go lower and sometimes above that number.

Q. Let me use your term.

A. Is that target?

Q. Yes.

A. Target.

Q. Can I then put the word minimum in front of it and say it is a minimum target? At any particular time that you use...

A. No, it is not a minimum target. It is a target. The extent it might be a minimum is, we do mention a range of between 20 and 24, and in that context the 20 might be the minimum of the target, and

the 24 the maximum.

Q. I was using that range, the higher or the lower to suggest that the lower end be the minimum.

A. We would not like to target below 20.

Q. That is fine. I apologize. That was what I was trying to get at here. That using that range, the 20 per cent, the lower figure, it would be the minimum target range for a reserve--

A. Yes.

Q. --for which you feel comfortable in order to meet the demands.

A. Yes.

Q. Perhaps you can help me here and tell me the kind of factors that were taken into consideration to develop this range for reserve.

A. Essentially, two factors determine the uncertainty, namely variations in performance of the generation, and variations in the load over what we expect. Essentially these, they give us the probability of various amounts of unsupplied energy. We use that unsupplied energy with customer costs determined from surveys to determine the cost to the customer of the unsupplied energy.

And then on the other hand, we look at the cost of operating systems with different levels of

reliability, and we combine those two, and we look for a minimum total customer cost. That is the analytical approach.

Then we check that by reviewing our own experience and by reviewing the experience of other utilities, and finally make a judgment on the appropriate reserve margin as a result of that.

Q. And in doing that or coming up with that figure, would you take into consideration, for example, the amount of time it would need for someone like my client to adapt to an outage? It would take some time for them to manage the operations in a safe way, in order to be able to expect less electricity coming, rather than more.

A. To the extent that it is reflected in the customer damage costs.

MR. BADER: Those are all the questions I have. Thank you.

THE CHAIRMAN: Thank you. I don't know who is next. Who is next? Are you next?

Wouldn't it be a bit more convenient to start in the morning, rather than take ten minutes tonight?

MR. STARKMAN: That would be fine.

THE CHAIRMAN: We will start tomorrow

with the Coalition of Environmental Groups, and we are missing, or absent without leave is Ontario Natural Gas, but I guess that will be straightened out.

MS. BLACKBURN: Mr. Chairman, we will be ready to go at ten, if you prefer.

THE CHAIRMAN? Is that all right with you, Mr. Starkman?

MR. STARKMAN: That is fine.

THE CHAIRMAN: How long do you plan to be?

MS. BLACKBURN: Forty-five minutes.

THE CHAIRMAN: All right, thank you.

THE REGISTRAR: This hearing will adjourn until 10:00 o'clock tomorrow morning.

---Whereupon the hearing was adjourned at 4:52 p.m. to be resumed on Tuesday, June 4, 1991, at 10:00 a.m.

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